

**Master Thesis:**

**EFFECTS OF PATIENT SAFETY MEASURES ON JOB  
SATISFACTION OF OPERATING ROOM PERSONNEL**

Thesis submitted as a part of the Master of Philosophy Degree in Health Economics, Policy and  
Management

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# Abstract

**Background:** Surgical interventions are high-risk healthcare services. Increasing awareness over the past years has led to efforts to enhance patient safety. Patients do not represent the only category that must be considered when analyzing adverse events since physicians are also affected. Hence, measures aiming at improving patient safety will inevitably affect both patients and physicians.

**Aim:** The current thesis is aiming at assessing the effects of patient safety measures on job satisfaction of operating room personnel working in an Italian hospital.

**Methods:** Data was collected in mid-March 2014 through 12 semi-structured interviews conducted during two visits to the operating room. Four surgeons, four anesthetists, and four anesthetist nurses were selected randomly on a voluntary basis among clinicians at work. The questionnaire items fell into the following categories: patient care, work burden, professional relationships, and general satisfaction. Thematic data analysis was performed with an inductive approach.

**Results:** Respondents from the three professionals profiles described the Surgical Patient Path to be an efficient patient safety measure. For what concerns their level of job satisfaction, although perceptions varied considerably, most respondents reported positive effects. Data showed that (1) positive effects were emphasized at the highest degree among surgeons in virtue of the perceived progresses in terms of safety both for the patient and for them, (2) anesthetist nurses were facing several problems during the data collection process, (3) perceptions differed among those that had a deeper knowledge on the program due to their managerial position or involvement in the its development and those that had less, and finally (4) participants were lacking information on results of the Surgical Patient Path.

**Conclusion:** According to the findings, communication should be addressed in order to avoid dissatisfaction. Clinicians must be given the tools needed to have a clear understanding of the results that have been achieved with the Surgical Patient Path. This is fundamental for the purpose of ensuring high levels of motivation to perform tasks diligently, harmonize perceptions and increase job satisfaction of anesthetist nurses.

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## Declaration

Hereby, I declare that I wrote this thesis myself under my supervisor's guidance with the help of no more than the mentioned means.

Up to now, this thesis was not published or presented to another examination office in the same or similar shape.

Forlì (Italy), 06/06/2014

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place and date

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signature

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## List of acronyms

**MLHSP:** (Italian) Ministry of Labour, Health and Social Policies

**CEO:** Chief Executive Officer

**EU:** European Union

**DRG:** Diagnosis-Related Group

**OECD:** Organization for Economic Cooperation and Development

**AMA:** American Medical Association

**JCAHO:** American Joint Commission on Accreditation of Healthcare Organization

**NPSF:** (Veterans Affaires) National Patient Safety Foundation

**VA:** Veterans Affaires

**WSPE:** Wrong-Side/Wrong-Site, Wrong Procedure, and Wrong-Patient Adverse Events

# 1. INTRODUCTION

The World Health Organization has suggested that in industrialized countries up to one in ten patients is affected by medical errors and in developing countries the risk is much higher. Surgical interventions represent a particularly challenging healthcare service and in industrialized countries alone they represented half of the medical errors accountable for disabilities and deaths (WHO, '10 facts on patient safety'). In the European Union, 18% of citizens claimed to have been victims of a serious case of medical errors in hospital settings and the World Health Organization sustained that, based on empirical studies, between 50% and 70% of medical errors could be avoided by implementing comprehensive measures for patient safety. Patient safety refers to the provision of healthcare services without medical errors, thus without harming the patient. By addressing patient safety effectively in the European Union, 750.000 adverse events could be prevented each year, thereby reducing days of hospitalization by 3.2 million, the number of cases of disability by 260.000, and deaths by 95.000 (WHO 'Patient Safety'). Adverse events are defined as unintended and undesirable incidents occurring during the healthcare process and that provoke harm to patients. Adverse events that are due to medical errors can be prevented (MLHSP 2009).

Other high risk industries such as nuclear power and aviation have achieved significant progresses in increasing safety inducing the World Health Organization and others to argue that healthcare, too, can reduce the incidence of medical errors by addressing the problem with a comprehensive approach. Albeit several risks, in aviation there is one in 1.000.000 risk of an aircraft passenger being harmed while traveling compared to one in 300 risk for a patient being harmed while receiving healthcare services. As other high risk industries have proved that safety can be drastically improved and by considering the fact that healthcare services have not just became more effective but also more complex and challenging in the face of new medicines and technologies developed for treating older and sicker patients, in 2002 the World Health Organization and its member states recognized medical errors as a global healthcare issue by adopting the World Health Assembly resolution on patient safety (WHO, '10 facts on patient safety'; WHO, 'Patient Safety').

The Italian Ministry of Labour, Health and Social Policies (MLHSP) has defined safety in the operating room to be fundamental for patient safety. The factors that make the operating room such a high risk

environment, even when interventions are not particularly complex, are the number of professionals involved, the amount of information required, the technological component, the patients' conditions, the fast-paced rhythm, and the various critical points during surgery when harm to patients can be caused. Limiting the impact of these factors is highly dependent on effective communication flows needed to establish a climate of collaboration among professionals. For this purpose, the Ministry of Labour, Health and Social Policies developed in 2009 a list of 16 objectives that must be pursued in each operating room in order to ensure patient safety. The first objective consisted of eliminating cases of wrong-site and wrong-patient procedures, whereas promoting communication was objective number 12 (MLHSP 2009). In its attempt of addressing culture resistance and to facilitate change of clinical practice in order to improve safety of surgical patients, the Ministry of Labour, Health and Social Policies has chosen the Directorate General of Health of Lombardy Region as one of its partners. The Lombardy Region is famous for its excellence in healthcare yet the close monitoring of medical errors proved the region was not immune to this problem. Between 1999 and 2007, 29.700 cases were detected and more than one third occurred in the operating room. The overall increase in healthcare spending was euro 87 millions and euro 25 millions were due to surgical errors (Ravizza 2007).

When analyzing adverse events patients do not represent the only category that must be considered because physicians are also affected. Literature suggested that as physicians feel they are expected to provide error-free healthcare, being involved in a medical error has a significant impact on them (Waterman et al 2007). Measures aiming at increasing patient safety will inevitably affect both patients and physicians. The current thesis is aiming at assessing the job satisfaction of the operating room personnel working at Morgagni-Pierantoni Hospital in Forlì (Italy) in the post-introduction period of the Operating Room Management System. The implementation of the system started in 2006 with the aim of increasing patient safety. The results achieved have went beyond the initial objective allowing Morgagni-Pierantoni Hospital to increase efficiency in the use of operating room resource.

## 2. HEALTHCARE IN ITALY

### 2.1. Development of the Italian healthcare system

Italy became the republic it is today after the constitutional referendum which took place in June 1946 to reveal people's preferences on whether the head of state should be democratically chosen or come from a family dynasty as it had been done so far.

In the entire post-war period until 1978 Italy had organized its healthcare system following the Bismarck model. Healthcare insurance was provided on work basis by sickness funds, called *casse mutue*, that were quasi-governmental institutions. Their financial performance was unsatisfactory and they were heavily relying on the financial support of the government. The coverage was not universal and the benefit package varied considerably across sickness funds and also across regions, as benefit packages offered in Northern Italy were more generous than in Southern Italy (Ministero della Sanita' 1975). Additionally, two other factors contributed to the health reform from 1978 that introduced the Beveridge model characterized by universal coverage and funded through taxes collected by the government: (1) the political power achieved by the Left political movement during the previous years, and (2) the decentralization of governmental power by giving the regions political autonomy through the 1948 constitution (France and Taroni 2005).

In December 1978 the Law 833/1978 introduced a drastic change in the Italian healthcare system with the constitution of the National Health Service which went into operation in 1980. The main purpose of the new system was to ensure universal coverage to all citizens and access across the country to the benefit package defined by the state abolishing this way geographical disparities (Donatini et al 2001). The financial aspect of the health system was also changed as the sickness funds did no longer exist. Collecting the necessary funds from taxes was now responsibility of the government. In other words, the financial source of the health system changed from payrolls to taxes and the body in charge of collecting and administrating the funds changed, too, since sickness funds were abolished. The underlying cause of change was the government's objective of controlling the growth of the health expenditure, and for this reason planning and budgeting were duties of the central authorities, whereas provision and control were duties of the local authorities (France and Taroni 2005). However, the roles



of the three different levels, central-regional-local, were still not clearly defined. The previous sickness funds were now replaced by local health authorities similar to the district health authorities from the National Health System of the United Kingdom with the difference that the local health authorities were governed by democratically elected authorities introducing this way the principle of public democratic control (Donatini et al 2001).

The second big reform was introduced through two Legislative Decrees, 502/1992 and 517/1993, that attempted to increase microeconomic efficiency given the low financial performance of the previous years and macroeconomic stabilization considering the financial crisis Italy was facing in that period. The former objective was to be achieved by introducing competition and managerialism in the health market through new mechanisms such as fees for service, diagnostic related groups and by transforming local health authorities and hospitals into public enterprises increasing this way their sensitivity to competition with private providers (Lozzi 2008).

The results achieved in quality of care were not satisfactory enough and thus a third reform was implemented in 1999 by passing Legislative Decree 229/1999. The new reform was aiming at reinforcing the objective of the 1978 reform, that is equal access across regions to the same benefit package. Additionally, it was aiming at promoting collaboration between bodies, giving greater power to physicians for what concerned clinical governance and finally strengthening autonomy of local authorities (France and Taroni 2005). The Legislative Decree 229/1999 was the central piece of a series of restructuring measures that defined the current organization of the Italian health system in which the central government allocates public funds to the 20 regions allowing them to freely allocate the funds to hospital within their territories according to reimbursement rates and quality standards that are defined at regional level (Hall 2012).

The most recent reforms were made aiming at reducing healthcare costs, in consideration of the austerity the Italian economy has been facing in recent years. In consequence, according to the European Health Commission the Italian public expenditure, 7% of GDP, was slightly below EU average, 8% of GDP as Paterlini (2013) suggested. The latest measure that led to this result was Balduzzi's decree implemented during the former Mario Monti government, with the objective to increase quality of care while at the same time increasing cost-effectiveness of the system by acting at mechanisms operating at regional level. The measures provided concerned a more effective use of

drugs, ensuring permanent access to health services with teams of general practitioners, updating prices of services provided and finally two innovative measures, introduction of health technology assessment and reorganization of the governance of hospitals and local health units (Thomson et al 2013).

In 1992 the decentralization of the healthcare system into three levels central, regional and local began. The central body, the Ministry of Health, which defines the basic benefit package, *livelli essenziali di assistenza*, is in charge of making sure the system is working according to the following three principles (1) equal access, (2) universal coverage, and (3) solidarity, and it makes sure that European regulations are being followed (Greco 2013, Donatini et al 2001). The Ministry of Health is also in charge of suggesting the 20 regions how funds should be allocated starting from the necessities of the population revealed in the yearly national health status. The regions have the final say in the allocation process within their territory, and they are also responsible for integrating the funds from the central government with regional taxes. The regions have been given legislative power, executive power and also power of evaluation in order to achieve national goals through regional plans. For this purpose, the regional health department issues guidelines, allocates funds, nominates CEOs of local health authorities and assesses their performance (Ibid). The local health authorities are in charge of the delivery of public health services, occupational and social healthcare, hospital care and primary care within their territory (The Commonwealth Fund 2012).

The national health system gave for a short period, 1992-1993, an opt-out opportunity and despite its abolition the rate of private health insurance has increased considerably from around 5-10% in the mid 1990s to around 35% according to recent estimates, reflecting dissatisfaction due to long waiting lists, high co-payments and not always satisfactory quality of service (Donatini 2001, Paterlini 2013).

## **2.2. Italian hospitals**

Financial resources utilized by hospital have always represented a relevant driver of healthcare expenditure, and 46% of the aggregated healthcare expenditure was attributable to hospital costs in 2008 (European Hospital and Healthcare Federation 2011). In the attempt of improving cost containment, starting from 1994 major hospitals were given the status of independent trusts and unlike

the rest of hospitals that are strongly financially dependent on local health units, the former received financial autonomy. Moreover, they received technical autonomy as well and such autonomies were also given to the local health authorities when it was decided they should enjoy greater flexibility when avoiding higher costs (Donatini 2001).

Hospitals in Italy can be either public or private. The latter can be divided in two subcategories: (1) private hospitals with private funds or (2) private hospitals with private funds as well as governmental funds if accredited to work for the national health system (Greco 2013). Starting two years before they received financial and technical autonomy, that is 1992, until 2004 public hospitals reduced their number from 1.832 to 1.214, whereas private hospitals increased their number although they are generally smaller than the public ones (Lozzi 2008). A 6,2% reduction of hospitalizations was observed in the period 1993-2003 from 8,8 millions to 8,25 millions, and hospital days were also reduced from 11 to 7,5 between 1994 and 2003 (Lozzi 2008). Cost containment through reduced capacity was also shown in the reduction of beds per 1.000 inhabitants in acute care, private and public hospital going from 6,7 beds in 1992 to 4,6 beds in 2004 (Ibid). However, according to Lozzi (2008) the variation was more significant in public hospitals than in private accredited hospitals and the author attributed the decision of cost reduction through reduced capacity to the absence of other monitoring and evaluation tools. Differences in terms of hospital beds are observed not only between private and public hospitals but also between northern hospitals and southern hospitals with 5,6 and 4,3 beds per 1000 inhabitants respectively (Paterlini 2013). Optimization of resources was pursued not only by reducing beds but also by increasing their occupancy from roughly 76% to 79% between 1998 and 2007. The European Hospital and Healthcare Federation (2011) further suggested that the usage of hospital resources has been improved considering that inpatient surgical interventions per 100.000 inhabitants were reduced by 11,6% in the period 1998-2008. Medical staff increased in average by 4,8% between 1997 and 2004 (Lozzi 2008). The number of nurses did not increase, maintaining Italy's peculiar composition of staff, that is more physicians than average European values and less nurses than average European values. More specifically, in 2004 Italy had 4,2 physicians and 7,0 nurses per 1.000 inhabitants while the EU average was 3,5 physicians and 7,3 nurses per 1.000 inhabitants (Hofmarcher 2006, OECD 2009, The World Bank 2014). The increased number of physicians accompanied by the reduction of beds led to an increase in the number of physicians per bed.

The complexity of procedures increased between 2000 and 2004 in hospitals located in North Italy. In

South Italy, although the number of hospitalizations is higher, the complexity of the interventions performed, judged by the case mix, is inferior. A significant number of patients living in the south take advantage of the possibility of choosing provider, local health unit and even region, and move northwards (Donatini 2001). In fact, in 2004 of all acute care patients 6,9% decided to use healthcare services provided by institutions located in North Italy despite the distance from their place of residence in South Italy (Lozzi 2008). In such cases the costs are incurred by the region where the patient resides and not by the region where services are provided inducing negative economic effects on southern regions and worsening their already weak financial performance. However, such cases may also foster the adoption of measure meant to increase quality of care from a complexity perspective in all regions.

As aforementioned, hospitals costs are a relevant driver of the overall healthcare expenditure being thus significantly responsible for the growth rate of the healthcare expenditure. As Lozzi (2008) indicated, in the period 1992-2005 hospital costs have doubled and this is mainly due to the expansion of costs of private accredited hospitals. For instance, in 2003 the average hospitalization cost in Italy was 3.493 euro (Lozzi 2008). Costs vary greatly from region to region and the average hospitalization costs per inhabitant in 2004 was 782 euro, the lowest average level, 711 euro, was registered in Tuscany and the highest, 1.134 euro, in Bolzano, a rich autonomous province located in North Italy.

The cost reimbursement mechanisms have changed several times along the years. They currently consist of prospective payments according to nationally defined rates that can be redefined at regional levels provided they are not higher. Rates have been set for (1) diagnostic-related groups used in reimbursing inpatient care cases, (2) fees for service used in reimbursing specialist care and diagnostic services and finally for (3) bed-day rates used in reimbursing long term care and rehabilitation. This mechanism started in 1992 and it developed progressively. In the period 1978-1992 hospitals were allocated yearly fixed budgets based upon historical expenditure. Before that, that is before the introduction of the national health system hospitals received their funds from the sickness fund, *casse mutue*, on a bed-day rate basis (Donatini 2001).

According to physicians European Hospital and Healthcare Federation (2011) Italy had among the highest ratios of physicians per inhabitant in 2008. There were 4,1 physicians per 1.000 inhabitants and 56% of them worked in hospital settings. The number of physicians, although still high, has decreased

since 1999 when Italy had the highest ratio of physicians per 1.000 inhabitants, 5,7 (Donatini 2001). On the other hand, the ratio of nurses per inhabitant was at the low extreme compared with other European countries with 7,0 nurses per 1.000 inhabitants in 2008. There has been a significant increase since 1999 when there were only 3 nurses per 1.000 inhabitants (European Hospital and Healthcare Federation 2011, Donatini 2001). Italy's under-supply of nurses and over-supply of physicians provokes an inefficient allocation of resources (The Commonwealth Fund 2012). In 1999 Greece and Italy were the only two countries with a higher number of physicians than nurses.

Remuneration of medical staff working in hospitals is done through salaries that vary depending on their position and level, first level physicians, *dirigente medico di primo livello*, with supporting responsibilities or second level physicians, *dirigente medico di secondo livello*, with managerial responsibilities. As Reginato and Grosso (2011) reported the average national salary of Italian physicians working in hospitals amounts to 36.200 euro per year. When considering the minimum-maximum range set at national level for physicians' remunerations, Italy is situated at the high extreme of EU values with a minimum gross wage per month of 4.500 euro and a maximum gross wage per month of 12.000 euro. By correcting values with the purchasing power parity indicator, Italy is second only to Belgium in the minimum-maximum range of salaries. Hospital physicians can increase their income by also working in private settings.

Nurses' remuneration consists of a basic wage and productivity bonuses given when the medical director and/or the nurse officer consider the requirements have been met (Donatini 2001). In 2001 the average monthly wage of a professional nurse, as reported in the International Labour Organization Statistics Database (LABORSTA) was 1.723,07 euro, whereas for auxiliary nurses it was 1.351,07. Wages increased until 2008, and the average annual growth rate between 2005 and 2008 was 5,4% starting from an average wage of 1.817 euro for professional nurses working 36 hours per week in 2005, that is without considering overtime payments, and arriving at 1.926,77 euro in 2008 (World salaries website, OECD 2013, LABORSTA). From 2008 to 2011, wages decreased at an 0,3% annual rate due to the economic crisis and the financial constraints the Italian economy was facing, but nurses' remuneration was still competitive as, according to OECD (2013), the ratio of nurses wage to national average wage<sup>1</sup> was 1,0 in 2011.

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1 The national average wage calculated by OECD considers full-time workers from all sectors of the country's economy.

Concerning medical studies both physicians and nurses must acquire university degrees from either public or private universities in order to be able to practice. Physicians must study not less than six years and practice in a hospital setting for six months or more. Subsequently, according to EU regulations, they must pursue postgraduate specialization, for a minimum of two years in the case of prospective general practitioners, allowing them to practice within any state member of the EU. Nurses must finish a three years long university course and take a state examination to be able to practice (Donatini 2001). Subsequently, they can pursue postgraduate specializations offered by universities or by healthcare institutions or other education agencies (Robinson and Griffiths 2007).

The Morgagni-Pierantoni Hospital is located in the municipality of Forlì (Emilia-Romagna Region). The Regional Health Authority of Emilia-Romagna consists of 11 local health units, four research hospitals, four university hospitals and one hospital trust that serve the region's 4.459.246 inhabitants plus patients coming from other regions that accounted to 14% of the total patients in 2011 and 13,8% in 2010 as reported by the region. The total health expenditure amounted to 8.514 billion euro in 2011 and 41,56% was hospital related. The regional per capita expenditure in 2011 was 1.909 euro slightly above the 2010 expenditure, 1.902 euro. In the 2001-2010 period Emilia-Romagna registered a 3,4% growth of the per capita health expenditure, including the inflow of patients from other regions, which is in line with the national average growth of 3,6% for the same period. In 2011 the region had 20.439 hospital beds out of which 77,6% were public and the remaining 22,4% were privately accredited. For the same year the region reported to have had 3,72 hospital beds in acute care per 1.000 inhabitants and 0,88 for long stay and rehabilitation. Waiting times for interventions are in line with national targets except for hip replacement and oncology. The long waiting lists for hip replacement are due to the high number of patients coming from across the country to the renowned Rizzoli Research Hospital located in Bologna. The employees of the Regional Health Authority of Emilia-Romagna were 62.294 in 2011 slightly less than in 2010, 62.527. The number of physicians increased modestly in the two year period from 9.121 to 9.140 (The Emilia-Romagna Regional Health Service 2013).

The region's well know high quality of care is due to a series of efforts in improving healthcare delivery such as 'hospital for care intensity' that started in 2012 with the aim of organizing hospital areas not based on pathologies but based on level of care required (The Emilia-Romagna Regional Health Service 2013). Additionally, the region started in 2013 the project SOLE, a network that renders accessible the clinical history of all individuals that give their formal consent. For this purpose

Electronic Health Records are being created in all 11 local health units and six large hospitals that will enable new models of care, cost reductions and higher quality through reduced risks of medical errors, time savings and easier transfers among providers (Gallelli and Darchini 2013). Thomas Jefferson University and the local health unit of Parma developed in partnership a project aimed at reducing morbidity and mortality related to hospitalization. The project adopted in 2013 consists of assessing the risks of hospitalization and mortality, starting from historical data, and then acting upon the results, in order to reduce morbidity and mortality while decreasing utilization of hospital beds and emergency room. Preventive measures are put in place by Medical Homes and in Parma alone 12 were opened in 2013 (Maio et al 2013). Although, the former two projects are still in their inception phase and thus not implemented across the entire region the objective is to extend them in the near future.

### **2.3. Development of the Surgical Patient Path at Morgagni-Pierantoni Hospital in Forli'**

Since 2004 the two hospitals of the municipality of Forli' , Morgagni and Pierantoni merged giving birth to the new Morgagni-Pierantoni Hospital that serves a population of roughly 150.000 individuals with its 34 specialties and 350 beds. Bringing together all surgical wards resulted into one operating room block with eight specialties, that is thoracic surgery; vascular surgery; general surgery; ear, nose, throat surgery; urological surgery; orthopedic and traumatology surgery; breast surgery, and finally ophthalmological surgery each with its own operating room. The operating room block has also three anesthetic rooms and one recovery room (Padovani 2013).

In order to assess to work of the new institution, in 2005 the local health authority assigned the task to report the performance of the hospital to a multidisciplinary team composed of managers, engineers, anesthetists, nurses and surgeons. Initially, the underlying motivation was to ensure patient safety is ensured in the new complex structure, but throughout time it evolved to including cost containment considerations by optimizing resource utilization. The team aimed at aligning physicians' interests to management's interests so as to increase efficiency and effectiveness in the operating room (Padovani

2013).

The project developed for the prevention of medical errors consists of three main tools: (1) a general checklist to ascertain patient identity, correct site and surgery type, (2) a more detailed checklist, and (3) the Surgical Patient Path. The second type of checklist is being used in two different variations both composed of similar detailed informations that must be collected by the operating room nurse in three different moments: sign-in, time-out, and sign-out. The Surgical Patient Path consists of (1) data collection, (2) data analysis, and finally (3) presentation of results (Buccioli 2012). Data collection refers to gathering data concerning the patient's path from the ward to the operating room and back. This is done by an operator who uses a device called personal digital assistant to identify patients by reading their bracelets in order to access a digital list from which steps will be selected and times recorded (Agnoletti et al 2013). The device's software allows the operator to see the patient's personal and medical information in order to ascertain that the intervention went according to plan and if not to ascertain that modifications are recorded. Once data is entered in the data recording system it is sent to the Operating Room Management System to be analyzed according to an algorithm based on the literature and the indications given by the professionals involved in the project (Buccioli 2012). Results obtained are presented separately for the three profiles that have been created, i.e. surgeon, anesthetist and manager (Agnoletti et al 2013).

The operator in charge of collecting data once the patient has entered the operating room is the anesthetist nurse, who uses the device to read patient bracelets and cards used to record room entry/exit, the latter being identified as the easiest and fastest way of recording times. The path from the ward to the operating room and back is registered by a healthcare assistant. For each path there can be up to 16 steps (Figure 1<sup>2</sup>) resulting into maximum 25 delta times (Figure 2<sup>3</sup>).

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<sup>2</sup> Agnoletti et al 2013 p. 3

<sup>3</sup> Agnoletti et al 2013 p. 5



Timing	1st Trial	2nd Trial
	Column A	Column B
1	Ward exit	Ward exit
2	Entrance ORB	Entrance ORB
3		Identification by nurse anesthetist
4		Entrance anesthesia room
5	Start anesthesia	Start anesthesia
6		End anesthesia
7	Entrance OR	Entrance OR
8	Start surgical procedure	Start surgical procedure
9	End surgical procedure	End surgical procedure
10	Exit OR	Exit OR
11		Entrance RR
12		Exit RR
13		Identification by healthcare assistant
14		Transport ICU
15		Exit ORB
16		Ward re-entry
ORB: operating room block. OR: operating room. RR: recovery room. ICU: intensive care unit.		

*Figure 1: Steps of the Surgical Patient Path*

n° of delta times and description	Formula
1 Patient moving time from ward to ORB	Entrance ORB – ward exit
2 Waiting time in ORB reception (AR induction)	Identification by NA – entrance ORB
3 Waiting time in ORB reception (OR induction)	Identification by NA – entrance ORB
4 Waiting time for anesthesia in AR	Start anesthesia – entrance AR
5 Waiting time for anesthesia in OR	Start anesthesia – entrance OR
6 Anesthesia time	End anesthesia – start anesthesia
7 Sum of anesthesia time and transport to OR	Identification by NA – entrance in OR
8 Transport time from AR to OR	Entrance in OR – end anesthesia
9 Waiting time in OR	Start surgical procedure – entrance in OR
10 Surgical time	End surgical procedure – start surgical procedure
12 Total pre-surgery time	Exit OR – end surgical procedure
11 Awakening time	Start surgical procedure – identification by NA
13 Total time from admission in ORB	To surgical starting time start surgical procedure – entrance ORB
14 Stay time in OR	Exit OR – entrance OR
15 Waiting time to come back in ward	Exit OR – exit ORB
16 Transport time from OR to RR	Entrance RR – exit OR
17 Stay time in RR	Exit RR – entrance RR
18 Waiting time at reception	Identification by healthcare assistant – exit ORB
19 Transport time to come back in ward	Ward re-entry – exit ORB
20 Stay time in ORB	Exit ORB – entrance ORB
21 Out ORB - transport in ICU	Transport ICU – exit ORB
22 Turnover time	Entrance OR next pts – exit OR previous pts
23 Over-time	Scheduled end of the daily work – exit OR last case
24 Start time tardiness	Scheduled start of the daily work – start surgery 1 <sup>st</sup> case
25 Under utilization	Scheduled end of the daily work – exit OR last case
ORB: operating room block. AR: anesthetic room. OR: operating room. NA: nurse anesthetist. RR: recovery room. ICU: intensive care unit. pts: patients.	

**Figure 2:** Delta times of the Surgical Patient Path

Two quality criteria have been introduced to ensure usefulness of data introduced in the system. The first rule is to alert the operator when there are less than seven steps recorded as paths with less than that cannot be correct. The second rule is to use a minimum-maximum range of values for acceptable delta times that were defined by the physicians during the trials of the implementation of the system

between 2006 and 2008 (Figure 3<sup>4</sup>) (Agnoletti et al 2013).

n°	Description	Limit inferior	Limit superior
1	Patient moving time from ward to ORB	5	20
2	Waiting time in ORB reception (AR induction)	5	20
3	Waiting time in ORB reception (OR induction)	5	20
4	Waiting time for anesthesia in AR	5	20
5	Waiting time for anesthesia in OR	5	20
6	Anesthesia time	10	60
7	Sum of anesthesia time and transport to OR	15	70
8	Transport time from AR to OR	2	10
9	Waiting time in OR	10	60
10	Surgical time	15	720
11	Awakening time	5	30
12	Total pre-surgery time	20	80
13	Total time from admission in OB to surgical starting time	30	120
14	Stay time in OR	20	720
15	Waiting time to come back in ward	5	90
16	Transport time from OR to RR	1	10
17	Stay time in RR	10	180
18	Waiting time at reception	5	20
19	Transport time to come back in ward	5	20
20	Stay time in ORB	40	720
21	Out ORB - transport in ICU	5	20
22	Turnover time	10	120
23	Over-time	30	300
24	Start time tardiness	6	120
25	Under utilization	10	90

ORB: operating room block.  
OR: operating room.  
RR: recovery room.  
ICU: intensive care unit.

**Figure 3:** The second data quality rule

As mentioned above results can be accessed by surgeon, anesthetist and manager. Each profile has subdivisions for more detailed information. The profile for surgeons has four subdivisions: S1 to give a general view of the surgical activity in terms of total number of procedures, five most performed

<sup>4</sup> Agnoletti et al 2013 p. 6

procedures, average time and standard deviation; S2 for comparisons between different weeks, months or years; S3 to present and Induction-Surgery Awakening information and finally S4 to provide information on the number of surgical procedure per DRG. The profile for anesthetists has also four subdivisions: A1 for an overall view of the anesthesiological activity; A2 to give information on patients who changed their scheduled pathway and where they were taken post surgery; A3 for information on induction and awakening data on specific patients and A4 for statistical information on anesthesia time, surgical time and recovery room time. The third profile for manager has five levels: M1 provides information on the surgical activity in terms of total number of procedures, number of scheduled and unscheduled procedures etc; M2 shows the results of comparisons between surgical wards; M3 shows detailed information on specific surgical wards; M4 provides efficiency indicators also called key performance indicators and finally M5 shows a Trasport-Induction-Surgery-Awakening graph in order to provide information on the average time and standard deviation of specific procedures (Agnoletti et al 2013).

As Buccioli (2012) suggests the data collection process is centered around four main components: (1) hardware through the use of a device, (2) software developed by hospital engineers, (3) logistics during the tracking of the path, and last but not least (4) the human component that allows to assign responsibilities for data introduction to the anesthetist nurse. Padovani et al (2013) provide additional description of the project through the presentation of the four main ideas it was based upon: (1) inclusive approach in the sense that the personnel involved was constantly asked for feedback during the development of the process, (2) ergonomics which refers to the fact the system was designed to be user friendly so as to avoid giving extra burden to the operating room personnel, (3) third party data collection is the idea of ensuring quality of the data being introduced in the recording system by assigning this task to the anesthetist nurse and not to the surgeon as it was initially planned, the shift of tasks was done upon observation of the fact surgeons had the tendency of introducing biased data; the final idea is (4) reuse since the devices were already available in the hospital which was a cost containment and resource optimization opportunity.

After the trials conducted in the 2006-2008 period the system became fully operative in 2009. Results achieved between 2009 and 2011 led to an award from the European Commission as '...a public healthcare organization in Europe that represents the best case of *Smart Public Service Delivery in a Cold Economic Climate*' (Padovani 2013 p. 2). The Operating Room Management System has not only allowed to reduce clinical risk of surgical patients but also to use available resources in a more efficient

way. In the period 2009-2011 no cases of errors during the surgical path were registered whereas during the previous two years, 2007-2008, there was one case of wrong site surgery, one case of wrong person surgery and also two cases of near misses of wrong site surgery. Operating room occupancy increased from 71% in 2009 to 79% in 2010, the number of unscheduled procedures decreased from 25% in 2009 to 14% in 2011 while at the same time the number of scheduled procedures increased from 75% in 2009 to 86% in 2011, high complexity procedures (>120 min) increased from 19% in 2009 to 21% in 2011 without negatively affecting overtime work. In fact, overtime work decreased from 28% in 2009 to 21% in 2011, allowing to reduce related costs from 524.000 euro in 2009 to 497.000 euro in 2010 (Agnoletti et al 2013, Padovani et al 2013). Additionally, the costs saved due to the Operating Room Management System are greater than those incurred for its implementation, and Agnoletti et al (2013) described the project as being of very low cost since it represents 0,0019% of the surgical costs on an annual basis.

During the development and implementation phase several obstacles have been faced. First of all, the 'hypertrophic state bureaucracy' and 'atavistic diffidence of innovation' characterizing Italian culture were responsible for the initial unsupportive organizational climate (Agnoletti et al 2013). Nonetheless, the conflict of interests between the medical and managerial professionals pursuing different objectives characterizing not only the Morgagni-Pierantoni Hospital has also played a significant role in the struggle of adopting this innovative system. Attempts to facilitate the acceptance of the Operating Room Management System consisted of: organizing team meetings for feedback and training; using the feedback during the development process for changes such as assigning the task of data collection to the anesthetist nurse and no longer to the surgeon, and using dashboards to draw attention on results achieved and increase motivation (Padovani et al 2013).

Regarding the limits of the Operating Room Management System Buccioli (2012) stressed two aspects: firstly, the quality of the results depends on the quality of the data introduced by the anesthetist nurse and secondly, efforts must be put in place to sustain the hardware and software.

## **3. JOB SATISFACTION**

### **3. 1. Job Satisfaction Theories**

For managers, identifying the factors that influence job satisfaction is crucial in order to be able to understand employees' commitment and performance. Hence, there is a waste array of contributions in the literature trying to shed light on what employees consider to be particularly relevant for their work since it was widely accepted that remuneration alone cannot satisfy employees on the long run. The aim of this subchapter is to provide a general view of the most important job satisfaction theories.

Bhatnager and Srivastava (2012) describe job satisfaction to be an attitudinal variable that refers to emotional response to work and working conditions meaning that job related characteristics are key determinants of an employee's level of satisfaction. Although relevant, they are not the only determinants. In fact, a variety of other factors have been identified in the literature that can be divided into two main categories: personal characteristics of the employee and social factors. However, the factors that compose each category varies greatly according to the theoretical approach adopted (Saifuddin et al 2012).

As Saifuddin et al (2012) suggest in their literature review, the standard classification of job satisfaction theories consists of dividing them into content theories and process theories. The former consist of theories that are meant to identify and categorize the determinants of job satisfaction into primary, secondary and high level factors according to their importance, whereas the latter consists of theories that examine the type of determinants that are particularly relevant.

The first remarkable contribution in terms of content theories was given in 1943 by Abraham Maslow in his paper Theory of Human Motivation where he presented the Hierarchy of Needs that contains five different types of needs all human have, although we might perceive them differently and feel different urges to pursue them. Maslow's Hierarchy of Needs is the most renowned theory in the literature on human needs and it set the foundation for the development of future job satisfaction theories. The five types of needs presented are: (1) physical needs such as nutrition, clothing and shelter, (2) safety needs that refer to living conditions that do not jeopardize one's life and freedom, (3) social needs in the sense

of being part of a community, (4) esteem needs such as prestige and recognition, and finally (5) self-actualization that concerns personal growth. In 1959, another contribution was given by Herzberg's Two-Factor Theory that distinguishes between (1) motivators also called job satisfying factors such as achievement, recognition and responsibility, and (2) hygiene factors like remuneration, supervisor, working conditions, company policy that are necessary in order to avoid dissatisfaction, meaning that even if they do not induce satisfaction directly they lay the grounds for an environment where job satisfaction can be achieved. A third relevant content theory is the two components Theory X & Y developed in 1960 by Douglas McGregor stating that the average individual intrinsically dislikes work and therefore s/he needs and prefers to be directed (negative assumptions from Theory X) or that s/he intrinsically likes work and therefore does not need external motivators (positive assumptions from Theory Y). Finally, the last content theory, Achievement Theory, was presented by McClelland in 1961 and developed around the idea of high level needs from Maslow's Hierarchy of Needs. McClelland suggested that individuals might like their work and be satisfied with it even without external motivators because some people have a natural drive to achievement and success and they value the power received through work more than other factors such as remuneration.

Saifuddin et al (2012) identified five process theories. The first one, Theory of Equity, developed in 1963 by J. Stacy Adams, is based on the idea that employees' satisfaction is related to the level of equity between effort they put at work and personal achievements. Hence, they are satisfied when their results are gratifying and in line with their co-workers' situations. The second one, Vroom's Expectancy Theory (1964) is centered around three factors that lead to job satisfaction: valence - personal preference for a specific outcome, expectancy - likelihood to reach that specific outcome and instrumentality - usefulness of the outcome in achieving a higher goal. The third one, Expectancy Model (1968), proposed by Porter and Lawler states that workers are motivated when the effort-reward relation presents a high probability and they feel satisfied when outcomes meet the expectations. The fourth theory, Goal-Setting Theory (Locke, 1968), suggested that the type of objectives presented to employees and supportive feedback are key elements for employees. Finally, the Job Characteristics Theory (Hackman and Oldham 1975-1976) correlates effective performance to sense of meaningfulness of work (Saifuddin et al 2012).

According to Lambrou et al (2010) theories on motivators and job satisfaction determinants can be classified into the following categories: (1) theories that focus on needs: Maslow's Hierarchy of Needs,

Herzberg's Two-Factor Theory, McClelland's Achievement Theory and Aldersfer's Theory that argues that people have three types of core needs managers have to focus on in order to motivate effectively: existence - basic needs, relatedness - need of having interpersonal relations, and growth - desire of completing meaningful work leading to self-actualization (Value Based Management 2014); (2) theories that focus on external motivating factors: Skinner's Reinforcement Theory arguing that the organizational environment must be designed by bearing in mind that employees repeat actions with positive results and cease actions with negative results (Management Study Guide 2014), and (3) theories that focus on internal motivating factors: Adam's Equity Theory, Vroom's Expectancy Theory, Locke's Goal Setting Theory.

Depending on the approach used, job satisfaction can be assessed globally or more specifically by considering different relevant work aspects. Bhatnager and Srivastava (2012) suggested that in order to identify job satisfaction the following aspects must be taken into consideration: work, quality of supervision, professional relations, promotion opportunities and remuneration. The aggregate level of satisfaction of each domain constitutes the employee's job satisfaction.

Applying the above mentioned theories to healthcare employees must be done by acknowledging their limitations. First, none of the theories can give a comprehensive explanation of the job satisfaction mechanism. Although they might all be valid none of them is error-free and applicability depends on the context. Second, they have been developed in North America and thus they reflect characteristics of the American culture meaning they must be applied cautiously to different cultural contexts. More specifically, what has to be considered is the following series of factors: (1) whether the culture is more individualistic or collectivistic, (2) preoccupied with material possessions (masculinity) or more with social well-being (femininity), (3) extent to which obedience towards authorities be it a manager or the country's leader is generally expected or not, and (4) power distance to reflect on the general attitude towards risk and ambiguity (Saifuddin et al 2012). Furthermore, when applying the theories to healthcare employees additional considerations must be taken into account starting from the premise that job satisfaction is crucial in determining the quality of medical care and the level of patient satisfaction. According to the literature, healthcare professional's satisfaction is mostly due to: decision-making autonomy, effective communication, working arrangements, supervision, problem solving attitude promoted at the workplace and ability to express one's point of view freely (Bhatnager and Srivastava 2012).



In recent years there have been several changes in the healthcare sector that affect physicians directly. Changes with a positive impact on job satisfaction are: increased training possibilities and reduction of working hours, whereas changes with a negative impact on job satisfaction are: increased administrative burden and increased pressure regarding time and efficiency in an attempt to contain costs considering the increase in health care costs of the last years (Bovier and Perneger 2003). The increase in job related stress induced by these changes affects healthcare professionals in more than one way as evidence suggests: quality of care provided and also personal wellbeing (Pisljar et al 2011). More specifically, what seems to cause stress is work overload, feeling poorly managed and resourced as well as dealing with patients suffering (Pisljar 2011, Ramirez et al 1996). Prolonged stress leads to burnout situations attributable to two categories of factors: burden of unsupportive relations with patients, their families and co-workers and personal factors such as intellectual stimulation and professional status/esteem (Ramirez et al 1996). Additionally, administrative burden plays an important role in impeding job satisfaction (Bovier and Perneger 2003).

All things considered, job satisfaction of healthcare professionals do not depend on economic incentives only. Lambrou et al (2010) showed that physicians and nurses from public hospitals in Cyprus valued non economic incentives more than economic incentives. The authors argued that these results are in line with Laubach's and Fischbeck's (2007) findings on motivators of German physicians. Personal growth opportunities and achievements seem to be the most important motivator according to Lambrou et al (2010).

In order to explain the human dynamics in the operating room Helmreich and Davies (1996) suggested using Edwards' (1988) SHEL model which argues that staff behavior is influenced by: software, hardware, environment and liveware. Software refers to the way of working in the operating room, e.g. sterile equipment, hand washing rules and other patient safety measures. Hardware and environment refer to the equipment used. This may be described by the producer to be the result of extensive ergonomic research and thus 'user friendly', but it is often perceived by the staff as an 'ergonomic nightmare'. Although devices might have an ergonomic design the final result of putting them together might differ. It is rarely the case that an OR is entirely renewed at once thus devices from different periods are put together in what might not be a user friendly environment with lights, gas lines, head and ground-level cables. Hence, tackling the problem of poor job satisfaction through medical technology tends to lead to a further increase in workload as employees need to acquire new knowledge

and skills increasing job complexity. Together with expectations of high performance they risk to be perceived as extra stressors (Pisljar et al 2011). Finally, liveware refers to the fact that surgical interventions impose team work and not all teams are equally efficient. Several factors influence team spirit and hierarchy is a crucial one even though it may vary considerably also depending on cultural factors. For instance, in the USA it is not uncommon for the surgeon to be the team leader, whereas in Canada, UK and Australia work dynamics are not normally led by the surgeon. Effective communication is also a key element and Helmreich and Davies (1996) reported that operating room personnel have overwhelmingly indicated communication as an area that requires improvement.

Communication is not important only for clarity but also for receiving feedback and encouragement. Krogstad et al (2006) found that Norwegian physicians and nurses valued greatly positive feedback and associated this with an underlying need of appreciation. Lambrou et al (2010) reported that appreciation by managers and colleagues is the main motivator of physicians and nurses as the study of public hospital personnel from Cyprus indicated. The need of supportive feedback is particularly relevant for nurses which report it to be the main factor leading to job satisfaction and work organization as the second most important factor (Krogstad et al 2006). For physicians, opportunities for development represent the leading factor although supportive feedback is also reported as being particularly relevant (Ibid). Other differences in the way nurses and physicians perceive motivators were reported by Lambrou et al (2010) who stated that nurses are more motivated by remuneration than physicians, and nurses showed higher general satisfaction levels than physicians. Differences have also been revealed between age subgroups. Older physicians, age range 46-55, and older nurses, >55 seemed to be more satisfied with their jobs than their younger co-workers (Lambrou et al 2010, Bovier and Perneger 2003). Plausible causes for the lower levels of satisfaction of younger health professionals might be lower income, prestige and autonomy which are also accompanied by a less developed professional network. These factors are not only responsible for lower satisfaction levels but can also lead to burnout especially in single professionals (Bovier and Perneger 2003, Ramirez et al 1996). Differences in satisfaction regarding work burden have also been noted between gender subgroups. Female personnel tend to be less satisfied due to the need of dedicating time and energy not only to their careers but also to their families for whom they often represent the main caregiver. Additional subgroups divided by specialities showed that operating room personnel reported the lowest level of satisfaction and psychiatrists reported the highest level (Bovier and Perneger 2003).

### **3. 2. Profession Specific Determinants of Job Satisfaction**

For surgeons the risk of committing medical errors represents a significant burden as shown by a study of 3,171 American and Canadian physicians reporting that 92% of them declared to have been involved in a case of medical errors (Waterman et al 2007). The strong impact on surgeons' morale is, first, showed by the fact that 70% attribute self-assessed medical errors to individual causes rather than system causes and, second, errors that occurred in the previous three months have a significant large impact on mental quality of life and may lead to burnout and depressive symptoms (Shanafelt et al 2009). Prevention of medical errors strongly relies on effective communication between operating room personnel. A survey of 34 American hospitals showed that surgeons' perception of communication was better than nurses' perception. Furthermore, nurses reported lower quality of teamwork with surgeons than among nurses (Carney et al 2010). Carney et al (2010) suggested that what makes communication between surgeons and nurses less well perceived by nurses compared to communication among nurses is related to the hierarchy of surgical departments where physicians have the last say. If nurses feel their comments are not considered information flows are more likely to be reduced. Attempts of improving information flows by implementing innovative measures are highly dependent on employee's perception of his/her ability to do well in the new circumstances as well as on the perceived significance of the innovative measure (Ibid).

For anesthesiologists the consequences of heavy workload have a strong negative impact on job satisfaction. Nonetheless, the effects of stress and fatigue on the quality of care provided seem to be a delicate matter. In fact, a study performed on 279 Californian anesthesiologists showed that half of the participants admitted to have made or have witnessed an error due to fatigue (Gaba et al 1994 cited by Flin 2003). They declared to be aware of the fact that being tired and stressed makes them work less effectively but they were reluctant to the idea of facing higher probabilities of committing errors despite their broad knowledge on how the human body works. Flin et al (2003) argued that the underlying cause might be fear of vulnerability as shown by the fact their coping strategies do not normally involve communicating that their workload is excessive and this is particularly true for junior anesthesiologists. Flin et al (2003) believed that although workplace behaviors can be culturally determined their findings on

anesthetists' reluctance to admit associations between work overload and quality of care provided is not a singular evidence of their study of Scottish anesthetists. Similar results have been reported in studies made in Italian, Swiss, German and American hospitals (Sexton et al 2000, Helmreich and Davies 1996 cited by Flin et al 2003). Eighty four per cent of the 222 Scottish anesthetists interviewed by Flin declared they committed errors in the operating room. Errors regarding drug administration and operating list errors were the most frequent, and only 39% considered that errors were handled appropriately. In order to improve working conditions and work satisfaction they indicated communication and teamwork, staffing resources and training as main aspects to be addressed (Flin et al 2003). High job dissatisfaction is one of the causes leading Finnish anesthetists to consider changing profession (Lindfors et al 2009). Factors that made them seriously consider the possibility of quitting their job were conflicts at the workplace, low job control, stress and organizational injustice that, according to the same sample, could be solved by improving communication and establishing trust and respect. The importance of communication was also stressed by Flin et al (2003), who stated that 40% of the anesthetists declared that they considered briefing and debriefing to be relevant communication tools for good teamwork and patient safety.

The literature review on job satisfaction of hospital nurses made by Lu et al (2012) indicated that job satisfaction does not depend solely on job characteristics but also on individual expectations. Results showed that causes and effects of job satisfaction for hospital nurses were similar. Causes of job satisfaction are intrinsically related to working conditions, organizational environment and commitment, job stress, role conflict and ambiguity, and finally role perception and role content. The elements playing a key role are working conditions, interaction, professional relationships, work itself, workload, economic and non economic rewards, promotion opportunities, decision-making power, job security and organizational policies (Figure 4<sup>5</sup>). In considering determinants of job satisfaction Glazer and Gyurak (2008) argued that it must be distinguished between culture specific elements and other elements that are not dependent on culture because they are specific to the profession. Based on their study of nurses working in Italy, Israel, UK, USA and Hungary they reported that work overload, performing certain tasks and patient type are job specific impeding factors to achieving high levels of work satisfaction, whereas conflictual professional relations, staff shortage and disorganization are stressors reported by Italian nurses as factor that make them feel on 'time pressure' and dissatisfied with their jobs. Additionally, what makes operating room nurses to suffer 'time pressure' is uncertainty

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regarding shifts, the need to work quickly, handle precision instruments and to master complex working techniques as well as medical errors. The most powerful stressor reported by OR nurses is patient safety and the most frequent is administrative feedback according to Chen et al (2009). The same study showed that nurses are not particularly motivated by the economic rewards they receive for extra work. Not all operating room nurses have the same satisfaction levels. Nurses older than 40 years present lower satisfaction and are more stressed. This could be related to difficulties in adapting to the changing conditions of an operating room as technology is rapidly advancing (Lambrou et al 2010). Moreover, nurses who have no children are more stressed than those who have children and a rich family life (Chen et al 2009).

Sources of job satisfaction	Key empirical sources
Working conditions	Adamson et al. (1995), Nolan et al. (1995), Tovey and Adams (1999), Adams and Bond (2000), Tzeng (2002a,b), Kuhar et al. (2004), Penz et al. (2008), Tourangeau et al. (2010)
Interaction	Adamson et al. (1995), Nolan et al. (1995), Lee (1998), Tovey and Adams (1999), Adams and Bond (2000), Aiken et al. (2001), Price (2002), Tzeng (2002a,b), Wang (2002), Kuhar et al. (2004), Sjogren et al. (2005), Tourangeau et al. (2010)
Relationships with patients	
Relationships with co-workers	
Relationships with managers	
Work itself	Nolan et al. (1995, 1998), Lee (1998), Lundh (1999), Tovey and Adams (1999), Adams and Bond (2000), Price (2002), Tzeng (2002a,b), Wang (2002), Kuhar et al. (2004), Sjogren et al. (2005), Penz et al. (2008)
Workload; staffing; scheduling and shifts; challenging work; routinization; task requirements (abilities, skills, etc.); psychological job demands	
Remuneration (pay, salary)	Adamson et al. (1995), Nolan et al. (1995), Lee (1998), Aiken et al. (2001), Price (2002), Tzeng (2002a,b), Wang (2002), Kuhar et al. (2004), Sjogren et al. (2005), Tourangeau et al. (2010)
Self-growth and promotion	Nolan et al. (1995), Lee (1998), Aiken et al. (2001), Price (2002), Tzeng (2002a,b), Wang (2002), Kuhar et al. (2004), Sjogren et al. (2005)
Professional training; opportunities of advancement; job promotion; personal achievement	
Psychological rewards: praise; recognition; encouragement	Nolan et al. (1995), Lundh (1999), Aiken et al. (2001), Price (2002), Wang (2002), Kuhar et al. (2004), De Gieter et al. (2010), Tourangeau et al. (2010)
Control and responsibility; autonomy; decision-making	Nolan et al. (1995, 1998), Lee (1998), Price (2002), Wang (2002), Kuhar et al. (2004)
Job security	Nolan et al. (1995, 1998)
Leadership styles; organizational policies	Lee (1998), Tzeng (2002a,b), Kuhar et al. (2004), Sjogren et al. (2005), Tourangeau et al. (2010)

*Figure 4: Sources of job satisfaction for nurses*

## **4. MEDICAL ERRORS**

### **4.1. Magnitude of the problem**

Problem solving processes start from acknowledging the presence of a problem. Seiden and Barach (2006) suggested that wrong-side/wrong-site, wrong-procedure, and wrong-patient adverse events (WSPEs) are not as rare as patients and clinicians believe. In fact, they argue that each year in the US there are between 1.300 and 2.700 cases.

Leape et al (1998) described healthcare as being the world's most challenging environment for ensuring safety. Its complexity gives multiple opportunities for clinicians to commit errors of different magnitudes. Ninety-two per cent of the 3.171 physicians interviewed in the study performed by Waterman et al (2007) declared that they had taken part in a case of medical error be it a near miss, minor error, or a serious error. This finding does not only reflect the need to address the problem due to its frequency but also because healthcare is a setting where harmless and serious errors are relatively easy to be confused (Pani & Chariker 2004). According to the American Institute of Medicine serious medical errors are responsible for 100.000 deaths annually resulting in the eighth leading cause of death in the US as their report from 1999 suggested (Awad et al 2005). The American Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has identified communication failures in the operating room as a key determinant of medical errors and thus, in 2004-2005 it declared improvements in communication as a main objective for increasing patient safety and especially for reducing WSPEs (Awad et al 2005, Makary et al 2006).

From the overall adverse events Flin et al (2006) found that almost half concerned surgical patients. They are determined by various causes including technical skills such as surgical expertise of clinicians and non technical skills such as team coordination, soundness of the decision making process, and leadership style. Clinicians' contribution to medical error episodes has to be acknowledged without overestimating it. It is true that good practices are needed in order to minimize error risks, but system features determine spaces for errors to be committed and the consequences. Traditional research has put a lot of emphasis on people as unreliable elements of the healthcare system without considering the fact

that clinicians' contribution consists mainly of adding the final ingredient to an already existing mix of risk factors. By struggling to identify root-causes through the agents involved in cases of medical failures, system features have long neglected (Leape et al 1998). Awad et al (2005) also criticized traditional research by pointing out that surgical outcomes were centered around the skills of the surgeon and around the risk factors presented by the specific case taken into consideration largely ignoring other factors such as communication and teamwork that have proven to be of great importance. An additional weak point was identified by Christian et al (2006) who suggested that studies of adverse events are retrospective trying to reconstruct events by using interview data and hospital records, thereby risking to work with information that could be incomplete. They stated that based on findings of retrospective studies they did not expect to identify safety compromising events in their prospective study of 10 complex cases of general surgery. Still, 11 safety-compromising events were found and only two would have been discovered by using hospital records. Cristian et al (2006) argued this finding cannot be considered study specific because it is consistent with other studies conducted by Kable et al (2002), Leape et al (1991), and Kohn et al (2001).

Acknowledging the magnitude of the problem and its complexity has led the main actors of the American healthcare system to organize the first multidisciplinary conference on medical errors in 1996 with the participation of the American Medical Association (AMA), the Annenberg Center for Health Sciences, the American Association for the Advancement of Science, and JCAHO. The following year the Veterans Affairs National Patient Safety Foundation (NPSF) was established and became one of the founders of the National Patient Safety Partnership together with JCAHO, AMA, Veterans Affairs (VA), the American Hospital Association, the American Nurses Association, and the American Association of Medical Colleges joining forces in a nationwide effort to reduce cases of errors based upon the belief that errors occur in all health care settings but they can and have to be minimized. NPSF's declared goals were to (1) promote research on medical errors, (2) spread knowledge on prevention tools also by taking into consideration inputs from other high risk industries such as nuclear power and aviation, and (3) improve communication given its relevance to patient safety (Leape et al 1998). In 2003, JCAHO had translated its findings on prevention of medical errors in a measures to be used by healthcare providers called the Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery. This consists of (1) preoperative verification of patient identity, side, site, and procedure together with the surgeon, (2) site marking, and (3) a time out before incision for a final confirmation, as preoperative concerns must be clarified and patient agreement must

be given in all cases. However, it is unrealistic to expect that the protocol will prevent all cases of adverse events (Kwaan et al 2006).

Studies have shown that large percentages of clinicians have been involved in cases of medical errors. Waterman et al (2007) found that 92% of the 3.171 clinicians participating in the study took part in such a case and Flin et al (2006) found that 74% of surgeons and 44% of nurses from the overall 352 operating room clinicians from 17 Scottish hospitals admitted they made errors in the operating room. Surgeons' errors concerned equipment, sterile field, and list accuracy, whereas nurses' errors concerned incomplete records, lack of consent, and communication breakdowns. A much more extensive study of safety in the operating room performed by the Harvard School of Public Health analyzed all wrong-site surgeries from an important American malpractice insurer in the period 1985-2004. In total 25 cases were found from a total of 2.826.367 surgeries. For 13 of the cases medical records were found, and thereby root-cause analyses were conducted. The 13 wrong-site surgeries resulted in 10 temporary-insignificant consequences, two temporary-significant consequences, and one permanent-significant consequence. The expression wrong-site surgery refers to all detected cases performed on the wrong person, the wrong organ or on the wrong vertebral level (Kwaan et al 2006). The reported rate of occurrence of the study is one in 111.054 interventions but it can vary considerably from specialty to specialty. A particularly risky specialty seems to be hand surgery with rates of occurrence four times higher, one in 27.686 interventions (Meinberg and Stern 2003 cited in Kwan et al 2006).

## **4.2. Determinants**

Root-cause analysis of adverse events from high risk domains suggests that human factors are more common determinants than technical (Flin et al 2003). Hence, implementing successful measures to prevent medical error requires a thorough understanding of what are the psychological causes leading humans to err and assessment of the extent to which human oriented measures can solve the problem. Pani and Chariker (2004) argued that although personal responsibility cannot be disregarded organizations have to assume their share of responsibility and discover statistically preventable errors to be able to implement measures aiming at decreasing the impact of the causal factors. Personal



responsibility should not be exacerbated by performing root-cause analysis focused solely on identifying who is to blame for an episode of clinical error. Surgical errors are often due to a lack of safety habits. Focusing on the professional directly involved in the specific case of medical error and in correcting their behavior is neither constructive for the overall system nor for the professionals involved. Staff needs to operate in a blame-free environment where they are given the possibility of learning from their mistakes and from the mistakes of others. The level of stress also has to be appropriately managed. Firth-Cozens (2001) reported that healthcare workers in Great Britain were more stressed than other professionals. Stress levels varied between trusts indicating that work related stress depends on organization-specific factors. Consequences of error episodes can even be extended on long term when practitioners involved become more anxious and cautious resulting in a defensive style of practicing medicine characterized by limited access to specific procedures and poorer patient care (Waterman et al 2007, Firth-Cozens 2001).

Edmonson (1996) showed that reported drug errors were more frequent in units with better quality of relationships, higher performance, and democratic leadership behaviors from nurse managers indicating that knowledge of errors depend on willingness to report them. In order for individuals to report errors a non punitive culture must be established where reports are handled productively and not as means for assigning blame. Two particular fertile grounds for errors to occur are organizations where responsibilities are not well defined and ambiguity gives multiple opportunities for misguided judgements even when professionals strive to do their best. According to psychologists an unclear transfer of responsibility, anxiety and anger has an unconscious impact on work by distracting people from the task they are performing (Edmondson 1996). Also, in organizations where staff is overconfident that mistakes are something that does not happen 'around here' patient safety is more at risk than where the risk is admitted and addressed (Pani and Chariker 2004). In their effort to present the psychological sphere of errors typical to the medical practice, Pani and Chariker (2004) further suggested that chronic workload impedes individuals from considering all aspects of the problems that would normally be considered because knowledge that is available in principle may not be deployed. Other factors that lead to errors are time pressure, interruption, tasks that are deceptively familiar and involve very similar items. They lead to errors by precluding effective memory, optimal inferences, recognition of unusual cases, and attention to details. Finally, they argue that medical judgments are not immune to biases as (1) heuristic decision making processes in which clinicians base judgments on what different factors represent to them based on previous experiences rather than what they really

represent, and (2) hindsight biases concerning the tendency to consider past events as more predictable than they are and especially more predictable than they initially seemed to be (Ibid).

Operating rooms are very complex environments where safety and performance rely heavily on how well information flows. In order to understand risk factors before they cause errors Christian et al (2006) performed a prospective study on ten complex cases of general surgery. The results showed that patient safety and performance were negatively affected by communication breakdowns, workload and competing tasks. Communication breakdowns alone led to oversights in patient preparation, waste of resources, overuse of staff, delays, and decision uncertainty. To ensure a deep understanding, two types of analysis were performed. The first one aimed at identifying safety-compromising events that could lead to adverse events, and the second one to identify system features that might affect patient safety and case progression. Safety-compromising events were due to the the following contributing factors: high workload, hand off events consisting of complete transfer of care giving activities from one professional to another due to the former's need of physically leaving the operating room, inexperience, patient characteristics, and hierarchy. Harm to patients was prevented in most case thanks to verifications and checks that acted as compensation factors. System features that affected patient safety and case progression were deficiencies regarding information flow, coordination of competing tasks and workload. Having to perform competing tasks that both require attention and accuracy decreased efficiency considerably (Firth-Cozens 1995). Findings regarding information flows showed that in average there were nine events per case in which information was either degraded or lost for an overall of 88 events. Among these, 76 had important consequences: 29 created uncertainty among staff, 19 induced delays in case progression, 15 increased workload, six led to resource waste, six generated risk situations for the patient and one led to the last-minute cancellation of an intervention. Twenty-two per cent of cases of information loss were temporally linked to hand offs. Communication events between surgeons and pathologists proved to have the highest risk of information degradation or loss. Similar results regarding surgeons were reported by Greenberg et al (2007) who showed that surgeons were involved in most cases of communication breakdown. Workload and competing tasks, the second type of system factors that affected patient care, refer to the need of performing patient-centered tasks and auxiliary tasks such as counting instruments, retrieving resources, discussing case management of other patients, and so on. Although auxiliary tasks are part of operating room work they distract attention from the patient and 12 instances were found in which the provider was distracted during high risk phases of the intervention, was unable to perform patient-centered tasks because his attention was on

performing auxiliary tasks, and case progression was delayed. The most time consuming auxiliary task was the instruments counting protocol accounting in average for 14,5% of the incision time. What made it particularly time consuming was the risk of committing errors while counting. In fact, in the nine observed cases there were 17 instances in which the counting presented inconsistencies and in 11 of these instances other team members were distracted. Another drawback of the counting protocol was given by the fact that while engaged in performing this task the scrub nurse responded to surgeon's requests with significant delays. Benefits of the counting protocol are debatable since manual counting seems to be at risk of error as shown by a study reporting that in 88% of cases of retained foreign bodies all instruments have been accounted for (Gawande et al 2003 cited in Christian et al 2006). Resource procurement by the circulating nurse is another auxiliary task that impeded the normal progression of the case and in some circumstances it forced the team to change technique. Auxiliary tasks were observed in the high intensity and high-risk phases of the cases and five instances were detected in which professionals were performing competing tasks compromising patient safety. For this reason, observers agreed in consensus it would be safer if these tasks were shifted where possible towards low intensity or low risk phases. One relevant finding of this study was that workload, hand offs, competing tasks and communication difficulties are not just 'annoying but accepted features' of the OR, but are also contributing elements to reducing safety. Thus, they should not be underestimated, and addressing them could be done efficiently by adopting measures that proved to be successful in the aviation industry. For instance, preoperative briefings could be used as an instrument for setting a common ground concerning the intervention plan and also for planning auxiliary tasks throughout the various phases and checklists could be used to ensure passage of information during hand offs (Christian et al 2006).

Greenberg et al (2007) give a significant contribution to the understanding of the patterns of communication failures through their study on malpractice claim. From the overall 444 claims 60 were malpractice cases that resulted in harm to patients due to communication failures. Seventy-two percent of the 60 cases involved a singular communication breakdown, 23% involved two communication breakdowns, and 5% involved more than two. The rates of occurrence were very similar between the three phases of the surgical process - preoperative, intraoperative and postoperative - with 38%, 30%, and 32% respectively. More than half of the interventions were scheduled or elective, 64%, only 13% were urgent, and 14% were emergent. One of the key determinants of errors consisted of interactions with co-workers and interactions with the system in the sense of environment. Co-workers' interactions

proved to be particularly difficult where status asymmetry between agents involved was verified, e.g. resident and attending, and when uncertainty concerning responsibilities was present. Thus, increasing patient safety in the OR requires reduction of communication breakdowns. This is a difficult task considering the high number of communicators taking part in the numerous communication activities of an OR. The number of communication events is also very high in the OR reaching up to 74 per hour for a charge nurse with a duration varying between 10 seconds and 10 minutes for an average duration of 40 seconds (Moss and Xiao 2004). Intraoperative communication failures are, as shown by Halverson et al (2011), mostly related with equipment and operation progress, with 36% and 24% of cases observed in 150 hours of observation respectively. Equipment was also reported as the main topic in the OR for charge nurses at three teaching hospitals accounting for 38,7% of cases followed by patient readiness in 25,7% of cases, staff issues in 18,8% of cases, room assignment in 10,7% of cases, and finally surgery schedule in 6,2% of cases (Moss and Xiao 2004). Halverson et al (2011) suggested that in order to prevent this type of failure in the OR additional efforts to ensure understanding by technicians and nurses of resources needed during the intervention must be made. It is very important to tackle efficiently this determinant factor of communication failures. The Veteran Affairs National Center for Patient Safety suggested that 82% of analyses performed on their database in order to detect root-causes of adverse events and close-call reports have identified communication failure as a causal factor (SPOT Database, VA National Center for Patient Safety cited by Awad et al (2005)

Communication impacts safety and quality of care through its effect on situation awareness, the process of information acquisition from people and devices. The operating room is a complex setting and in order to accomplish its goal professionals must perform their tasks in complete awareness of the situation. It is not useful for everybody to know everything at all times, but rather for the right person to receive the right information at the right time. For this purpose coordination of team members is essential. The effectiveness of the operating room team is dependent upon the extent to which its members engage in effective information sharing events. Complete communication events between individuals are composed of the following steps: sender initiates message, receiver accepts message and provides feedback, and finally sender double checks that message was understood as intended. In their study Parush et al (2011) observed ten surgeries for an overall 461 communication events. Of these, 49% were susceptible to information loss, and 33% closed the loop with delay due to the receiver. Situations in which the loop was not closed were also observed. These communication problems compromise patient safety.

### **4.3. Preventive measures**

Since 1998 JCAHO is spreading knowledge on the impact that communication and collaboration failures have on wrong-procedure, wrong-site, and wrong-patient cases. In 2003 it promulgated the Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery in order to standardize part of the communication flow in the operating room and set quality standards (Makary et al 2007, Kwaan et al 2006). Data suggested that the lack of standardization and team integration in the operating room were intrinsically related to cases of communication failures (Lingard et al 2004 cited in Awad et al 2005, Greenberg et al 2007). Even so, it would be unrealistic to expect that surgical errors will always be avoided. For example, Kwaan et al (2006) identified in his study of malpractice claims five cases that could not have been prevented with the protocol. In two cases the patients presented multiple lesions and both surgeons and patients were unsure on the treatment. In one case a magnetic resonance image from a referring hospital was used without realizing that it was from another patient with the same name. In another case the surgeon changed procedure side and consent was given, but the patient did not remember giving it because he was sedated. The last case concerned thoracic outlet syndrome was flawed due to the resection of the wrong rib. After reviewing claims from a large American malpractice insurer over a period of 20 years, Kwaan et al (2006) suggested that the main risk factors of wrong-site surgeries were high time pressure, multiple procedures during the same intervention, emergency operations, and participation of multiple surgeons. Therefore, the protocol cannot possibly solve all causes leading to wrong-site surgeries being a tool designed to maximize the informational content of communication events. Furthermore, the protocol of site verification is time consuming and requires personnel attention especially since it involves redundancy of checks. According to safety expert James Reason redundancy of checks raises the following issues: (1) under conditions of particular time pressure professionals might feel it is necessary to neglect the protocol in order to keep up with patient flow, (2) distracting and interrupting the professional in charge with data recording is dangerous, (3) check points must be independent, and (4) if multiple checks imply multiple professionals the process might become perceived as being too complicated increasing chances of not being adequately followed (Kwaan et al 2006).

Similarities between the aviation industry and healthcare together with the decrease in error rate

registered by the former have led to several attempts of applying measures taken in the aviation industry in high risk settings of healthcare such as the operating room (Awad et al 2005). Aviation specific successful measures adapted and applied in healthcare comprise briefings, debriefings, measurement of crew performance, and training through simulation. Potential benefits of implementing briefings/debriefings consist of transferring information in real time. This may lead to a common understanding of the situation, giving the opportunity of discussing doubts and putting all team members on the same page, setting standards on how to communicate. It also gives the opportunity of planning the intervention collaboratively, and hence increasing teamwork perception (Ibid). Makary et al (2007) showed that operating room briefings not only prevent wrong-procedure, wrong-site, and wrong-patient cases, but also act as a tool for teamwork promotion between anesthesia and surgery staff, and as a tool for taking into consideration different caregivers during the decision making process in the operating room. Assessment of clinicians' perception on briefings and debriefings was performed by Flin et al (2006) in 17 Scottish hospitals. Results from the 352 respondents showed that 79% of nurses believed a briefing before incision was relevant for patient safety compared to 37% of surgeons. Seventy eight per cent of nurses believed debriefings after intervention were relevant for patient safety compared to 44% of surgeons. The reluctance showed by surgeons in considering briefings and debriefings as effective safety mechanisms might be related with cultural resistance of operating rooms. In fact, cultural resistance and the connection between cultural change and error reduction is a well known concept in the aviation industry. Addressing medical errors is a complex process from an educational perspective. It starts with spreading knowledge as the first step towards changing behaviors. Nonetheless, knowledge does not necessarily imply that attitudes or behaviors will change. Professionals not only need to know the new procedure but also to perceive it as relevant (Makary et al 2007). The relevance of briefings is shown by the fact that the quality of communication in general surgery has improved for surgeons and anesthesiologists in the post introduction period of briefings. Absence of improvements for nurses may be due to the fact that briefings have been introduced in general surgery only, and all nurses have taken part in the survey (Awad et al 2005). As for patient care, implementation of briefings resulted in improved administration of appropriate prophylactic antibiotics and deep venous thrombosis prophylaxis (DVT) relevant for patient outcomes. Other results from University of Louisville Hospital also show benefits in administration of prophylactic antibiotics, venous thromboembolism prophylaxis, intraoperative temperature observation, and glycemia besides giving the certainty of correct patient identity and correct surgery site (Altpeter et al 2007). Briefings

have also enabled surgery staff to cancel interventions scheduled to be performed on patients at high risk for proceeding for reasons such as undialyzed end-stage renal disease patient, significantly increased coagulation parameters, and patient self-administration of platelet inhibitor the night prior to planned operation (Awad et al 2005).

Different perceptions in the operating room do not concern only briefings and debriefings. They extend to communication as surgeons and nurses report to consider it being at a better level than anesthetists. Flin et al (2006) in their study performed in 17 Scottish hospitals also showed that surgeons had a better perception of communication and leadership in the operating room than trainee surgeons and nurses. Mills et al (2008) interviewed surgical staff members from six institutions before the introduction of the Medical Team Training. They concluded that the most common pattern found in five of the six institutions studied was that nurses and anesthetists had similar perceptions that differed from those of surgeons that were more positive. In the only institution with different results surgeons seemed to be more aware of the problematic aspects of communication, situational awareness and organizational support. The staff from this facility had already received team training. Makary et al (2006) in their survey of 2,135 operating room staff from 60 hospitals found that perceptions of teamwork with surgeons in the operating room differed significantly between surgeon and nurses. Surgeons considered that everyone in the operating room was performing well in terms of teamwork. They reported the quality of collaboration with other surgeons as 'high' or 'very high' in 85% of cases, whereas nurses report 'high' or 'very high' level for collaboration with surgeons in only 48% of cases. In other words, surgeons reported high levels of satisfaction regarding collaboration with co-workers from their discipline, but they received low ratings and so did anesthetists. Nurses were given the highest overall ratings. Differences in perception have also been reported by Sexton et al (2000) who studied 1,033 operating room personnel. They as well reported surgeons to have higher levels of teamwork perceptions than anesthetists and nurses (Awad et al 2005). According to Makary et al (2006) the fact that surgeons had a good perception of collaboration with nurses which was not reciprocated by the latter is due to (1) different understandings of what good teamwork is, (2) differences in training, responsibilities, authority and status as well as communication style imposed by the profession. Surgeons and nurses tend to communicate differently, surgeons have a pragmatic style of communicating, whereas nurses have a more holistic communication style (Ibid).

Flin et al (2006) found among operating room staff support for an idea of invulnerability to fatigue and

stress. Sixty three per cent of nurses and 52% of surgeons believed they worked equally well during the critical phases of intervention despite being tired. Only half of the subjects from each category believed that personal difficulties might affect their work. Only 40% of surgeons said they would communicate to other team members if their workload was excessive versus 69% of nurses. The reluctance in admitting the effects of stress and fatigue on performance has also been reported by Helmreich and Davies (1996). Staff reported that they did not feel management put the same emphasis on patient safety as they did because managers tend to be more preoccupied with other goals such as cost containment or waiting lists. Only a third of the nurses and less than half of the surgeons believed that a patient safety failure would concern the management more than a failure in cost containment, waiting lists or reputation. Regarding alignment of the concerns of the clinicians versus the management 25% of the surgeons did not feel that their concerns were listened by managers compared to 51% of the nurses. Moreover, 59% of the nurses believed that surgeon's leadership style is autocratic, whereas 54% of the surgeons believed the adopted leadership style was consultative, revealing the fact that nurses reported to have reasons to feel dissatisfied with managers' and surgeons' attitudes towards them (Flin et al 2006).

The importance of communication has been acknowledged at institutional level in the UK in early 2000 when courses on communication skills have been introduced by the Royal College of Surgeons of England and by the Royal College of Surgeons of Edinburgh (Flin et al 2006). Providers have also focused on enhancing these skills in the operating room by introducing Medical Team Trainings, a measure that has been developed in 2003 by the American National Center for Patient Safety based upon the crew resource management model used in aviation with the final aims of improving patient safety and job satisfaction through communication, situational awareness and teamwork (Gillespie et al 2010, Mills et al 2008). After 150 hours of observation on how teamwork and communication evolved in the operating room Halverson et al (2011) concluded that during the pre and post period there were no differences in the type of communication failures. They observed a significant decrease in the occurrence rate of communication errors per hour; 0,737 before (standard error 0,098) and 0,270 after the training, (standard error 0,060). Efficiency assessment of the Team Training curriculum must be made cautiously because decreased compliance is a common phenomenon in the post training period (Salas et al 2008 cited in Gillespie et al 2010). Compliance with the Team Training curriculum registered a decrease from 86% at two weeks distance to 66% at four weeks distance (Halverson et al 2011).



The 352 clinicians interviewed by Flin et al (2006) say they do not consider surgical errors as a sign of incompetence and that they rarely saw errors due to lack of knowledge. Gillespie et al (2010) indicate based on their literature review of 12 studies of team training intervention from UK and US that 70% of the detected surgical errors are to be attributed to communication breakdowns.

Using innovative technological applications for improving patient safety through communication is a solution to patient safety proposed by Moss and Xiao (2004) as well as Seiden and Barach (2006). Automated patient tracking to monitor their location and readiness might make communication more efficient for surgeons, anesthesia staff, operating room and floor nurses, and also for ambulatory surgery staff. In order for these applications to be efficient they must be developed following the settings' specificities. Otherwise, they might impact operating room functioning negatively, as it happened at Cedars-Sinai Medical Center (USA) where a \$43 million application was removed in 2003 because it was too time consuming and not helpful for patient safety (Moss and Xiao 2004). Christian et al (2006) give another example of the fact that not all safety measures are necessarily beneficial, considering the negative effects of the counting protocol aforementioned. Parush et al (2011) argued that many operating room devices are not designed to allow all staff access, assimilation and utilization of critical information, instead of improving communication they increased ambiguity.

The literature review conducted by Gillespie et al (2010) showed that efforts to improve communication have registered some progresses, but given the cultural resistance specific of the operating room setting the process of culture change must be sustained through persistent efforts, behaviors must be monitorized, and feedback must be provided in order to reinforce desired attitudes. One of the problems existing in operating rooms is given by the fact that nurses tend not to express their concerns regarding patient care to surgeons. Makary et al (2006) suggested causes are likely to be due to the operating room hierarchy which discourages such practices. Hence, organisational cultures must be built where safety is perceived as everyone's objective and thereby everyone feels free to speak up when patients might be harmed. Organization-wide efforts must be accompanied by team efforts of smaller level in order to create a climate of openness towards admitting errors and learning from them. Putting safety objectives on some professionals' shoulders more than on others might create tension and inefficiencies. Group mentalities are not common in healthcare which is partially responsible for allowing errors to happen. Medical teams are complex and composed of different members that prevent each other from erring when they collaborate and communicate efficiently. Teams that work reliably in

high risk environments present the following characteristics: (1) expertise and responsibilities are in the hands of the same person, (2) team members all put effort into keeping up with the team's progresses, (3) progress is an ongoing effort, (4) communication is coordinated, and (5) things that might go wrong are considered ahead and prevented (Pani & Chariker 2004). Such cohesion often lacks in operating rooms. The necessity of being heavily competent in technical skills has maybe given little space to developing nontechnical skills. Professionals tend to operate individually to complete their task rather than operating as interdependent team members (Gillespie et al 2010). Evidence from the aviation industry shows that even under fatigue conditions teams that have been working together made less errors than teams that did not work together long. Taken individually long lasting team members made more errors but other team members compensated for them. This is one of the reasons why good teamwork is associated with lower levels of stress. Increasing safety requires first of all individual and organizational change and learning. During the process of change the team represents a crucial element because team leaders heavily influence the outcome of the change and how well team members function together also determines the outcome (Firth-Cozens 2001).

The quality of information flows together with trust and situational awareness define coordination in the operating room and thereby the quality of care (Gillespie et al 2010). Different perceptions of communication and safety and the fact that surgeons have the best perceptions are reported by different studies. Mills et al (2008) in their study of surgical staff members from 6 institutions who were interviewed before the introduction of the Medical Team Training concluded that the most common pattern found in five of the six institutions studied was that nurses and anesthesiologists have similar perceptions that differ from those of surgeons who are more positive. In the only institution with different results surgeons seemed to be more aware of the problematic aspects of communication, situational awareness and organizational support and the staff from that facility had already received team training.

The most commonly used tool for improving communication is briefings. Eight interventions out of 12 were bundled as Gillespie et al (2010) reported. Of the nine studies that reported team outcomes, eight reported improvements in teamwork spirit, collaboration and communication. Briefings and debriefings were particularly relevant for discussing factors that designed the intervention's outcome helping this way surgeons to listen to other professional and junior professionals to speak up. Another study of 128 operating room staff from a Canadian hospital who were interviewed pre and post intervention to

evaluate progresses in operating room communication due to briefings indicated that more than one third of briefings, 100 out of 295, were found to have been useful in the decision making process, detecting and helping to solve problems, and in 44 of the cases the procedure plan was changed due to aspects revealed during briefing. Communication failures were reduced from 3,95 to 1,31 per intervention. Concerning staff's perceptions 92% agreed that briefings were useful to problem resolution, 88% agreed it helped prevent mistakes, and 81% that they were worthwhile overall (Lingard et al 2008). Altpeter et al (2007) considered briefings and more generally the practice of surgical time out as indispensable considering it can go beyond its purpose of preventing wrong-site surgeries when well implemented.

## 5. STUDY

### 5.1. Research objective and research question

The Operating Room Management System proved to be an efficient tool for risk control without incurring high costs. It has also acted as a cost containment tool allowing the Morgagni-Pierantoni Hospital to increase its efficiency level regarding use of operating room resources such as personnel and occupancy. For these reasons the hospital has been awarded in 2011 by the European Commission the European Public Sector Award as one of the best cases of Smart Public Service Delivery in a Cold Economic Climate (Operating Room Management Research website).

This attempt to increase patient safety within the organization generates, in my opinion, mechanisms worthy to be studied. More specifically, I am interested in exploring the personnel's perception of the dimensions of work that have been altered and the effect they have had on job satisfaction.

Thus, the research question is as follows:

**What was the impact of the Surgical Patient Path on the level of job satisfaction of medical staff in surgical units?**

### 5.2. Significance of study

The current study will be beneficial for the management of the Morgagni-Pierantoni Hospital by providing results on clinicians' perceptions of the Operating Room Management System. The study's results could represent the basis for implementing effective human resource measures. In other words, by understanding in which way and to what extent the Operating Room Management System has altered the job satisfaction of clinicians, the hospital will be assured an advantage in developing future staff policies on the cutting edge upholding this way its reputation as a healthcare institute of excellence. Formulating measures to improve unsatisfactory conditions and preserving the strength points of Operating Room Management System might increase job satisfaction and performance with

benefits for the management as well as for the personnel.

## **6. DATA AND METHOD**

### **6.1. Study design**

In order to assess the link between medical errors and job satisfaction, Morgagni-Pierantoni Hospital was considered to be an adequate case study due to the existence of the Operating Room Management System and its remarkable results in terms of patient safety and operating room efficiency (Agnoletti et al 2013, Padovani et al 2013). As a matter of fact, Morgagni-Pierantoni Hospital was already enjoying an excellent reputation at national level for using innovative measures that had been successfully implemented for drug administration, patient identification, and housekeeping work.

In the original design the study was planned to be quantitative. Data were to be obtained through a survey of the operating room personnel by using a standardized questionnaire. The survey was planned to reach out to all clinicians involved in the Operating Room Management System so as to have a response rate that could allow a quantitative study. The aim of the study was to assess participants' judged relationships between the Operating Room Management System, patient safety and job satisfaction. For bureaucracy difficulties the sample had to be reduced and in the new case scenario it was decided together with the hospital's management and the supervisor that a qualitative study was the only feasible solution considering the limited time-budget. The sample was narrowed to 12 clinicians: four surgeons, four anesthetists, and four nurses.

I used the standardized questionnaire, originally built for the quantitative study, as basis for collecting data for the qualitative study through semi-structured interviews. The questionnaire items fall into the following categories: patient care, work burden, professional relationships, and general satisfaction (see Appendix I). Previous research (Bovier and Perneger 2003, Ramirez et al 1996) has indicated that these types of items are pertinent to understanding the dynamics of job satisfaction, and thereby the impact the Operating Room Management System has had on clinician's job satisfaction.

## **6.2. Sample design**

I conducted the interviews in mid-March during two visits to the operating room. Respondents were chosen randomly on a voluntary basis among clinicians at work. The director of the operating room explained them verbally what the thesis project consisted of and they were subsequently asked if they were interested in participating. The interviewees were conducted in the various offices of the operating room. All of them were conducted in Italian except one that was conducted in English. Audio recordings of all interviews were taken and transcribed to facilitate thematic analysis. Quotes were translated from Italian to English while data analysis was done without translating the transcriptions as I speak both languages. All participants gave written informed consent, and ethical approval for the research project was obtained from the Norwegian Social Science Data Services.

The operating room employs 85 surgeons, 22 anesthetists, 20 anesthetist nurses, and 46 operating room nurses. The sampling strategy aimed at achieving a purposeful sample in order to capture different perspectives of the impact on job satisfaction that the patient safety measure has had. For this purpose, perceptions of the three main types of professionals involved - surgeons, anesthetists, and nurse - were analyzed. In order to avoid interviewer bias, social bias, privilege of any one type of analytical perspective or any one type of information, four interviewees from each of the three professions under study were considered a sufficient data source for the study's purpose given the limited time budget. Operating room nurses were not part of the study because it was unclear to the author until entering the operating room that Morgagni-Pierantoni Hospital's efforts of reducing errors comprise more than the Surgical Patient Path, that is two checklists filled in by the operating room nurse in addition to the Surgical Patient Path whose data collection is responsibility of the anesthetist nurse once the patient is brought to the operating room.

I analyzed data analysis when all interviews had been conducted. During interviews I reflected by paying particular attention to differences and similarities between participants' responses as well as ideas and issues discussed in order to build potential questions for future interviews.

Using the procedures consistent with content analysis (Bazeley 2013), data analysis started with the familiarization process by listening the audio recordings several times and reading repeatedly the transcripts of the interviews. During the familiarization process interviews and subgroup summaries of

different depth were made. Afterwards, each transcript was coded and code memos as well as code lists were used.

The research process was both inductive and deductive. The deductive component refers to the fact that key points to be discussed with participants were drawn from the literature, but for the goal of giving accurate representations of the reality of the situation an inductive approach was adopted allowing modifications of the relationships between concepts throughout the analysis process.



## 7. RESULTS AND DISCUSSION

### 7.1. Anesthetist nurses

The sample of anesthetist nurses consisted of four individuals, three males and one female, from the Department of Anesthesiology. Their age ranged from 38 to 58 years-old and their working experience at Morgagni-Pierantoni Hospital varied from 7 to 40 years. The anesthetist nurse with the shortest working experience joined the operating room team when the Surgical Patient Path was in its experimental phase. The fact that the sample included this wide range of working experiences represented an opportunity for capturing a variety of perceptions on the effects of the Surgical Patient Path. The anesthetist nurse with the shortest working experience reported his personal point of view without having had the possibility of seeing other significant changes that have happened previously in the operating room and their effects, whereas the other three were more familiar with the dynamics of the operating room throughout the years given their extensive experiences (average 24 years).

The interviews lasted on average 19 minutes as it was agreed with the operating room's management that interviews would last approximately 15-25 minutes. This agreement referred to interviews with subjects from all three professional profiles. The maximum duration was 25 minutes and the minimum was 12 minutes. Generally, anesthetist nurses were eager to let themselves be heard. Nonetheless, they appeared to be preoccupied by the consequences of their responses:

*'I'm not sure I can say this [Operating Room Management System data is not used to plan operating lists]. Oh yeah, I can. I even said it to the person who is in charge.'*

Anesthetist nurses reported modest impacts on their job satisfaction. The Surgical Patient Path had a temporary positive effect on the job satisfaction of one participant, a lasting positive effect for another participant, and the remaining two reported no effect on job satisfaction.

Causes of lasting positive impact were: increased patient safety and job security due to the fact that anesthetist nurses are not easy to find in the Italian healthcare system. Thus, by acquiring this extra skill necessary to the hospital they became harder to substitute:

*'I believe another important thing is the fact that in many places there are no anesthetist nurses, operating room nurse also work as anesthetist nurses. We have this distinction and if one day they decide to cut down personnel it is unlikely that an anesthetist nurse will go away. I see it [Surgical Patient Path] as an extra skill that helps us maintain our jobs. Among all things we do this is fundamental.'*

Lu et al (2012) suggested that job security is one of the key elements for nurses' job satisfaction. This finding has resonance in this setting, particularly given that the Italian healthcare system has been facing financial constraints in recent years due to the recession. Following from this, anesthetist nurses might have felt their positions jeopardized by the cost containment measures of the hospital.

The temporary positive impact was due to a sense of empowerment that was initially perceived by one nurse who felt that by being in charge of the data collection process anesthetist nurses became more important professionals in the operating room's daily routine. This positive perception was diminished in the post implementation period because of insufficient feedback concerning efforts to comply with the hospital's policies for patient safety. The anesthetist nurse would have liked to have more information on the findings of collected data, and on the use that was made of these results. He indicated the coordinator of his ward as the professional he would like to provide more feedback on results of the data.

Insufficient feedback is an issue that was presented as a key factor impeding higher job satisfaction levels. The need of supportive feedback as a particularly relevant factor for job satisfaction of nurses was also reported by Krogstad et al (2006). Supportive feedback could build a solid basis for job satisfaction to be obtained as a consequence of the fact that it fulfills the need of recognition. This was presented in Herzberg's Two-Factor Theory of Job Satisfaction (Saifuddin et al 2012) as a hygiene factor meaning that even though it may not lead directly to an increase in the level of job satisfaction, job satisfaction without this element cannot be expected. Additionally, the Goal-Setting Theory developed by Locke in 1968 (Saifuddin et al 2012) suggested that motivation is intrinsically related to meaningful goals accompanied by feedback. In general, anesthetist nurses seemed to be aware of the importance of the Surgical Patient Path but they were lacking feedback. One nurse added that he felt anesthetist nurses should have been involved more in the development of the data collection process. This would have allowed an increased motivation in performing tasks.

The only nurse that did not raise the issue of insufficient feedback reported several ideas that were in

contrast with that of other anesthetist nurses. Unlike the other nurses, his views of the Surgical Patient Path were more favorable and his answers were more elaborated. The underlying cause of these differences might be the fact he was more informed than his co-workers due to his position, nurse coordinator, and to his participation in the development of the Surgical Patient Path. He argued that there was an evolution of how anesthetist nurses perceived the measure, that they initially saw it as extra workload but that they were generally satisfied with it, and technical problems of the device used to introduce data in the system represented the only negative factor:

*'I feel they [ anesthetist nurses] initially saw it as extra work but now it would be difficult to find someone who is not satisfied with it. The only problem is that the devices are of very low quality, the battery dies quickly and internet connection is a problem, too. When we have these problems, people start complaining.'*

Perceptions differed with regard to the emphasis given to the technical issues. The anesthetist nurse coordinator pointed out technical issues as the main cause why his colleagues might not be satisfied, while the latter pointed out the lack of feedback. This discrepancy might indicate communication gaps among members of this professional category.

All anesthetist nurses reported positive effects on their relation with patients, sense of being well managed and resourced, as well as patient risk, yet reported causes leading to these positive effects were heterogenous.

Relation with patients was improved because communication events became more frequent and richer. Anesthetist nurses became more sociable to patients and this was beneficial in helping the latter to tackle surgery stress:

*'It [relation with patients] improved because we communicate more. The things that are written down must be asked and then having a talk comes naturally.[...] Socializing is very appreciated by patients because it helps them reduce a bit surgery stress.'*

It was also reported that patient safety measures became more systematic. The Surgical Patient Path acted like a reminder, thus the likelihood of skipping steps of the process was lower than before. Before having to use the standardized set of questions required by the Surgical Patient Path, due to the human component, measures taken to increase patient safety varied from case to case. This variation did not exist any longer and a higher quality standard was applied to all surgical cases:

*'It [relation with patients] definitely improved in the sense that now the Path requires that specific questions are asked. Before some questions may have been omitted, whereas now it's all very systematic and the process is much more standardized.'*

Sense of being well managed and resourced improved in all cases and three anesthetist nurses reconducted it to an increase in safety. One of them argued it was also due to the fact it became clearer who does what since the Operating Room Management System contains data on the operating room's activity. The fact that work was being tracked was seen as a positive aspect. One nurses said:

*'In some special circumstances having the data has turned out to be useful for me. I definitely feel better managed and resourced.'*

On the other hand, negative aspects were revealed, too. One anesthetist nurse argued that drug administration represented a drawback of the software because it often happened that it was not updated and for this reason he had to engage in the time consuming process of searching the surgeon, ask him to update the treatment in the software, log out from the device used for data collection and drug administration so he could log in afterwards and see the update the surgeon had just made in order to be able to continue his work. This inconvenience made him lose the patient out of sight.

Another anesthetist nurses argued that the sense of being better managed and resourced was affected by the fact that the Surgical Patient Path was not used at its full potential to achieve the efficiency goals set by the management. More specifically, data from the Operating Room Management System was not being used to plan operating lists, which would significantly improve the patient flow within the operating room.

Finally, the only aspect that was perceived negatively by anesthetist nurses was having adopted a bundled intervention for patient safety, that is the Surgical Patient Path and two checklists<sup>6</sup>. It was unclear to them the need of such an extensive effort that they considered to be repetitive work:

*'I feel to be having extra work not that useful, if I may use this term, because there are also checklists that repeat the work.'*

In their considerations concerning the level of risk within the operating room, one of the anesthetist nurses, who had the most extensive working experience at MPH (>40 years) argued that the operating room had been a safe system even before the Surgical Patient Path. Even so, he noticed progresses in

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6 For details see 2.3. Development of the Surgical Patient Path at Morgagni-Pierantoni Hospital in Forlì

the post implementation period. All participants believed risk of medical errors was now lower although one argued that the extent of the reduction was unclear. Two anesthetist nurses had contradictory perceptions concerning the bundled intervention for patient safety. One argued measures should be integrated because they were responsible for a waste of energy, personnel, and time since they had to stop every time a problem was encountered:

*'As anesthetist nurse I am in charge of the Surgical Patient Path. Then, there is the operating room nurse in charge of the intraoperative checklist. There is also another form (i.e. checklist) being used that was not yet implemented across all wards. It's the form concerning the surgery site and it is again the operating room nurse who's in charge of it. I believe they create confusion and repetition of work. They should be integrated. I ask the patient questions on his identity and 10 minutes after my colleague asks the same things. These measures are independent from each other and there is a waste of energy. Two clinicians doing the same action to me is a waste of energy and personnel. They create confusion because if one encounters a problem, we all stop. There is a problem on the checklist, we stop, a problem with the Surgical Patient Path, we stop again.'*

However, another anesthetist nurse regarded these multiple checks as a strength:

*'The system is now safer because when there is something wrong, for instance with drug administration, the device shows you. This way double checks with other data are easier and there are less chances of making mistakes.'*

The differences in perceptions of nurses on the bundled intervention might be linked with the cultural resistance of operating rooms. This might stem from insufficient knowledge. However, considering the efforts that have been taken-workshops, presentations, dashboards on the operating room's walls- in order to ensure access to information, it is unlikely that this was the cause unless nurses were not targeted sufficiently. The lack of alignment of perceptions despite measures to spread knowledge is a finding that supports results reported by Makary et al (2007), who showed that information alone does not suffice for professionals to change attitude towards an element of novelty as they need to perceive it as being relevant for their work.

To all anesthetist nurses the Surgical Patient Path represented a stressor although for different causes. Technical problems and insufficient feedback seemed to be the strongest causes of stress. Other causes were: (1) need to acquire new knowledge and change routine, (2) workload increase during the development process for one anesthetist nurses that was taking part in this process, and (3) lack of recent updates to render the software more user friendly.

Technical issues represented a key stressor for nurses because in addition to the normal workload not only were their tasks increased but also the unning of their daily routine was rendered more challenging by software and hardware factors. More specifically, anesthetist nurses complained about the fact that internet connection was seldom problematic, batteries were very easily discharged, and, as mentioned above, drug administration was hard to keep updated. The magnitude of these problems' effects on nurses' morale is not surprising in light of the findings presented by Helmreich and Davies (1996). The two researchers reported that the use of the SHEL model and its four components software, hardware, environment, and liveware, normally used to explain staff 's behavior in relation to opportunities of committing errors, has revealed that often users had a much worse perception of hardware and software than producers.

The anesthetist nurses reported that work stress had not been influenced solely by the Surgical Patient Path through Operating Room Management System data collection. The 2004 unification between the municipality's two hospitals had been perceived as a significant stressor for anesthetist nurses that were already employees of the hospital in that period. The increase in stress occurred because patient care became more complex and workload increased in terms of number of interventions. Increase of workload was reported also by another nurse who despite working at the hospital did not reconduct the increase with the 2004 unification nor with an increase of interventions performed. She felt it was due to the fact tasks for anesthetist nurses have increased throughout the years.

Another aspect that one participant reported as a significant stressor for was communication in the operating room in the sense that the anesthetist nurses did not feel free to express his point of view despite his extensive work experience at the hospital (>17 years) because he felt that 'anesthetist nurses must mind their own business'. The nurse felt that in the operating room's hierarchy there was little space given to anesthetist nurses to express their point of view and concerns in interprofessional interactions. Throughout the years this perception became a source of dissatisfaction. The distinction among professional profiles discouraging nurses from expressing their concerns regarding patient care and work organization was also suggested by Makary et al (2006). Data showing a strong connection between being able to express one's point of view freely and job satisfaction is in line with results reported by Bhatnager and Srivastava (2012). The nurse's perception of an operating room hierarchy of interprofessional relations where nurses held less privileged positions in terms of freedoms and power than other medical professionals was a concept emphasized in other studies, too (Reeves and Lewin

2004).

A striking discrepancy of perception was also found in relation to overtime. Only one anesthetist nurse confirmed that, based on data he had access to given his position as nurse coordinator, overtime was reduced thanks to improvements made possible by Surgical Patient Path. The other three participants did not perceive any effect, neither positive nor negative. The only dimension that was influenced was workload due to supplementary tasks consisting in data collection. One plausible explanation might be given by the fact that individual decreases were too low to be perceived.

All four nurses reported to have a profound sense of responsibility for the quality of healthcare they delivered both at an individual level and at group level, the latter showing a sense of group belonging. Three anesthetist nurses reported that they felt that quality of care was improved. They argued that the process of care had become more comprehensive, patient safety had increased, coordination between wards was easier now, and data collected were a valuable resource for retrospective analysis. In the view of one anesthetist nurse quality was not affected. It was merely how and when questions were asked that changed since the Surgical Patient Path was implemented. He argued this influenced safety not quality, and that these are two independent dimensions of healthcare.

In determining patient safety and quality of care professional relations play a crucial role especially when considering communication events between clinicians. Two anesthetist nurses claimed that they would tell coworkers if they saw them on the verge of making an error. One of them believed he would feel more confident in doing so for an anesthetist given their closer professional relation, and to let know a surgeon, the operating room nurse would be more appropriate since they work in closer contact and have more similar knowledge. The other anesthetist nurse, on the other side, stressed that it was fundamental to let anyone know and that this was the operating room's work philosophy:

*'We work in teams and if we see something about to go wrong we say it straight away. Especially in an operating room this is fundamental.'*

This openness towards expressing concerns was not commonly reported since, as aforementioned, one nurse felt that there was little space given for nurses to state their point of view. In fact, data suggested there is a variety of perceptions regarding communication in the operating room and anesthetist nurses felt differently about expressing themselves. One of the causes accountable for these differences could

be the working experience in the operating room. The anesthetist nurses who argued that he would let any other professional know about something that might represent an issue of patient care, was considerably younger than the other participants and he started working in the operating room when the Surgical Patient Path was starting to be implemented. For the purpose of increasing patient safety, attitudes to risks were changing at that time and he did not have the possibility to internalize the aspect of unequal interprofessional relations that seemed so entrenched for the others with an extensive working experience in the operating room.

## **7.2. Surgeons**

The sample of surgeons consisted of four individuals, two males and two females, from three different departments: Head and Neck Surgery, Cardiovascular and Thoracic Surgery, and Orthopaedic Surgery. Their age ranged from 37 to 54 years-old and their working experience at Morgagni-Pierantoni Hospital varied from 7 to 26 years. Due to the variety of working experiences it was possible to include perspectives of both surgeons with very little experience as well as surgeons with extensive experience during the pre-implementation period of the Surgical Patient Path. For this reason, it was possible to capture different perceptions on the effects the Surgical Patient Path had in the operating room.

The average length of interviews was 15 minutes. The maximum duration was 23 minutes and the minimum was eighth minutes. Surgeons appeared to be particularly busy compared to the other interviewees and responses were given in a concise manner. In one case the information flow between interviewee and interviewer was rather scarce.

All four surgeons said that the Surgical Patient Path had positive effects on their level of job satisfaction. A female surgeon said it strengthened the already high level of job satisfaction she has had throughout her career, while in the remaining three cases it was beneficial in reaching a higher level mainly because the surgeons felt that they found themselves interacting with patients in a safer system. Also, one surgeon stressed that her job satisfaction was intrinsically related to the management's efforts to improve work in the operating room that she greatly appreciated. Findings concerning surgeon's



appreciation of the decrease of patient care risks are in line with results presented by Waterman et al (2007) that showed that the risk of committing medical errors represented a significant burden for physicians.

Negative aspects outlined were: (1) the Surgical Patient Path slowed down the fast paced rhythm of work in the operating room, and (2) clinicians tended to adopt a defensive attitude when errors were detected by assigning blame rather than focusing on causes. Establishing a blame free patient safety culture is an important step in allowing the Surgical Patient Path to deliver its results, yet this objective had not been fully achieved to date. Analysis of medical errors episodes focused excessively on assigning personal responsibility are not favorable to the development of a blame free environment where errors are reported and data utilized constructively to improve the system. Findings of other studies have showed that the lack of organization cultures that accept and use constructively errors induce a style of practicing medicine that can be detrimental both to the patient and to the organization through limited access to specific procedures and poorer patient care (Waterman et al 2007, Firth-Cozens 2001).

When discussing time dedicated to Surgical Patient Path-related tasks surgeons seemed to be having different opinions. While two surgeons considered these tasks to be time consuming for an operating room's time budget, another surgeon argued that *'we're only talking about a couple of minutes before intervention'*.

The Surgical Patient Path induced positive effects according to all four surgeons on (1) quality of care, (2) sense of being well managed and resourced, and (3) risk reduction of medical errors.

Quality of care was improved through better communication between clinicians and patients. In light of this, positive effects were generated both for patients and surgeons. The latter were given more possibilities to discuss last minute details of the intervention with patients, thereby improving their sense of delivering healthcare services that satisfy patients' needs to a larger extent. Additionally, surgeons pointed out to have noticed that patients have a better understanding of all the efforts that were being put in place in order to maximize their safety and this was reassuring and helpful for patients in tackling surgery stress. Patients did not seem to surgeons to be disturbed by the fact of having to answer all the questions they were being asked:

*'When they come in the operating room with the anesthetist nurse you can see they are very happy to answer all that huge amount of questions they are being asked. So, I believe they perceive it as a positive thing, as an extra effort made for them. They are going through a delicate moment and they need to feel involved in what is being done to them. I really believe patients have a very good impression.'*

Surgeons all agreed they were better managed and resourced. One surgeon argued that making mistakes is natural although not desirable, that everyone makes them, and therefore it is crucial to adopt preventive measures aiming at restricting error possibilities. The system was perceived by all as being safer, and this was mainly due to the fact that data were checked repeatedly according to two surgeons. For another surgeon the strength lied in the data that were being used:

*'Risk is reduced and, at the same time, it is all based on solid data. We don't rely on empty words, we register everything.'*

Risk reduction was a positive effect unanimously perceived among surgeons. Two of the respondents argued that operating room activity was already based on a patient safety philosophy meaning that the Surgical Patient Path represented the next step of an evolution process. One of the surgeons, acknowledging progresses achieved in terms of risk of medical errors raised the issue of the unclear extent of the progresses. This might represent a good indicator of the fact surgeons, too, must be provided with additional feedback on the Surgical Patient Path's results.

All surgeons agreed that the Surgical Patient Path did not have any impact on overtime. They reported that their overtime hours had neither decreased nor increased. This might be a consequence of the fact individual variations were not significant enough to be perceived clearly. As a matter of fact, both anesthetists and anesthetist nurses emphasized the need to further improve the use of Operating Room Management System data to better plan operating room activity. It is mainly through this channel that work is better organized.

Although the process of patient care was altered through increased quality of care and risk reduction, surgeons did not report significant changes in their relations with patients. An inconsistency regarding this aspect was found as one surgeon stressed a positive impact on communication in the operating room with subsequent positive effects on patient's morale:

*'The relation is now better because communication with patients in the operating room is improved. And I also feel they are less stressed now. They have more direct contact with the surgeon, who can*

*help them with surgery stress, explain them the procedure. The relation is improved, they feel less abandoned and they feel safer.'*

The surgeon in question linked progresses in terms of communication not only to better relations with patients but also to better professional relations. However, data showed his views were not shared by his coworkers as they consistently outlined that relations with patients and coworkers have not been altered. Regarding their relations with patients surgeons considered that the Surgical Patient Path did not modify the way they interacted because they had always performed empirical checks before starting procedures. The fact that the checks became more systematic decreased the risk of errors, but it did not alter the way surgeon approached patients.

Surgeons' perception of communication in the post introduction period of the Surgical Patient Path was better than those reported by nurses. This finding is consistent with those reported by various studies conducted by Carney et al (2010), Flin et al (2006), Mills et al (2008). Anesthetist nurses reported negative impacts, whereas among surgeons they were not perceived. This might objectively stem from the fact that anesthetist nurses were in charge of the data collection process, which was considered time consuming especially when technical issues occurred and efficient task management was impeded. In consequence, communication events of nurses deteriorated. On the other side, positive impacts on communication were emphasized by surgeons. Makary et al (2006) argued that nurses and surgeons have different communication styles imposed by their profession, that is surgeons are more pragmatic and focused on task completion while engaged in information flows, whereas nurse have a more holistic style of communicating.

Stress had been affected by the Surgical Patient Path in different manners. Negative effects due to higher workloads induced an increase in surgeon's stress. On the other side, positive effects have also been generated leading to lower levels of stress. This result was attributed to the higher quality of information flows among operating room professionals that minimized risks and hence stress was reduced. It was also reported that efforts that were put in place in order for the Surgical Patient Path to work were less than the benefits it delivered. Lack of effects on the level of stress have also been pointed out by two surgeons.

The increase of job stress throughout the years represented a key element reported by participants. In one particular case the increase was associated with the transition from residency to being an attending

surgeon and the subsequent increase in responsibility and complex interventions performed. In the other two cases stress was reconducted to management policies. In other words, new tasks assigned by managers and higher objectives in terms of performance made work conditions to be considered as stressors:

*'Stress has definitely increased and it keeps on increasing as years go by because we are constantly asked to do more things during working hours. And it's not like we were wasting time before, I mean our time was already full [...] Because of bureaucracy and informatization there are new tasks every year: one more form, two more pages, three more pages, and you have to do them all following the time frame.'*

Bovier and Perneger (2003) suggested that in recent years there have been several changes in the healthcare sector that affected physicians directly. Among changes with negative effects on stress and job satisfaction higher administrative burdens played a significant role.

Surgeons consistently stressed a sense of responsibility for the quality of the healthcare services they delivered individually and as surgical teams. One surgeon emphasized that he felt to be having the highest level of responsibility on his shoulders since he was the one patients relied on, the one they came back to when expectations and results were in contrast, and the one who was legally responsible for the intervention. The same surgeon perceived that group dynamics have evolved in light of the effects induced by the Surgical Patient Path. Communication among operating room clinicians was more efficacious, and it stimulated information flows among the various professional figures working in the operating room. In addition, it inspired professionals to feel more intimately responsible for delivering safe healthcare:

*'..we could say this control mechanism improved professional relations because we [surgeons] communicate more among each other; with nurses, with anesthetists, and anesthetist nurses. We all feel involved in trying to make things work better. '*

Previous results of Reeves and Lewin (2004) outlined the surgeons' tendency towards considering collaboration as activities that occur among medical specialists rather than among clinicians of various professional profiles. For this reason, the strengthening of interprofessional collaboration represented a significant positive effect generated by the implementation of the Surgical patient Path.

### 7.3. Anesthetists

The sample consisted of four anesthetists from the Department of Anesthesiology. Their age ranged from 36 to 57 years-old, and their working experiences at Morgagni-Pierantoni Hospital varied from five years to 20 years. The anesthetists with the shortest working experience, five years, joined the Department of Anesthesiology when the Surgical Patient Path was already implemented. He used his previous working experience in a different hospital where such a patient safety measure did not exist as a basis for reporting differences in his work.

The average interview length among the anesthetists was 19 minutes. The maximum duration was 33 minutes and the minimum was six minutes. Anesthetists with a deeper knowledge on the Surgical Patient Path gave more elaborated answers compared to those of other anesthetists. In addition, the former's perceptions tended to be more favorable than those of the rest of the interviewees including surgeons and anesthetist nurses, too. The underlying reason was the fact that two participants who had more information on the Surgical Patient Path than the rest due to their managerial position or to their involvement in program's design.

The Surgical Patient Path contributed to a higher job satisfaction in two cases. In spite of that, it was stressed that the impact on job satisfaction was limited by implementation problems:

*'...I am still in a waiting mode. I believe a lot in this project. I am very satisfied with what we accomplished so far and that we are now able to detect errors before committing them. If we made other progresses that would be better but more time is needed for that.'*

The remaining two anesthetists claimed that their satisfaction level did not suffer any variations because job satisfaction can only derive from offering high quality healthcare and the healthcare process per se starts after performing the checks required by the Surgical Patient Path:

*'It has very little to do with satisfaction. I feel more protected, but satisfaction is something you have for a job well done. And the work has yet to begin when we finish the controls.'*

The anesthetists consistently stressed that positive effects had been induced on the following elements of the healthcare process: (1) quality of care, (2) risks of medical errors, and (3) sense of being well

managed and resourced.

Quality of care was improved due to five main driving factors. The factors were: (1) patient flow inside the operating room was better monitored, (2) personnel's attitude to patient safety was more systematic, (3) controls were being done together with the patient in an explicit and exhaustive manner, (4) error prevention was more effective, and finally (5) collected data allowed retrospective evaluations for managerial and medical purposes.

Concerning risks of medical errors all anesthetists perceived a reduction although they reported that the extent of the reduction was unclear. Also, they stressed the importance of disclosure of data results concerning risks in order to give feedback and keep clinicians' motivated in taking part in the Surgical Patient Path:

*'...how many cases for wrong site are tracked before the operation? I don't know. [...] I mean, the system in the real world, not in the experimental setting, has limits. One of the limits is given by the fact that you need to know the output of this data if you want to implement it in a hospital. This is very important also for the team because in this way the team is motivated to perform its duties every day'*

The sense of being well managed and resourced was generally improved. Anesthetists deemed this positive effect to be attributable to the following factors: (1) the system was safer, (2) personnel was better managed and more protected, (3) there was more flexibility in the use of operating rooms, and finally (4) the operating room culture was less resistant to changes and this was also shown by the increased use of health technology assessment. One anesthetist claimed that from his perspective the Surgical Patient Path had high potential to induce a positive impact on the sense of being well managed and resourced but due to its partial implementation he did not perceive significant changes:

*'...we know that when this measure will be working at 100% it will help us feel more protected and it will also allow us to organize our work better. Now it is not being used at its maximum.'*

This inconsistency might stem from the fact the anesthetist in question had more knowledge regarding the Surgical Patient Path and its potential due to his managerial position. In light of this, his expectations might have been set higher than those of his coworkers and thereby they became harder to meet.

Positive impacts on relation with patients were generally reported although one participant pointed out

he had always paid particular attention at patient safety from his own initiative, thereby the introduction of the Surgical Patient Path did not change significantly the way he interacted with patients. He had always asked his patients the informations he needed in order to complete his work and the standardization of this step did not influence the way he relates to patients:

*'Now there is a checklist but I used to ask the things concerning my work before as I ask them now, and generally speaking the relationship with patients is as before.'*

The other anesthetists, however, stated that their relation with patients was improved due to an increased contact between the two that helped anesthetists to know better their patients. In absence of the Surgical Patient Path, anesthetists had contact with their patients only a couple of weeks before the intervention during visits. Now, in the preoperative phase they were incentivized to interact more and this was beneficial for building a patient-physician relationship:

*'... before the implementation the patient was a kind of ghost in the operating room because sometimes you can see patients only the morning of the operation not before because a part of this system is to visit every patient one week or two weeks before the operation. Now there is an extensive preoperative evaluation and I think this is very important to establish a relationship with your patient. I believe this is one of the values of this system.'*

In addition to this, data showed anesthetists considered the patient flow in the operating room to be better organized and less stressful although workload increased and tasks became more rigid. Participants did not report significant changes on their working hours. One anesthetist believed his overtime might have been reduced in recent years but he did not have a clear understanding of the extent of the reduction. Another anesthetist claimed that from his perspective the Surgical Patient Path could be used to reduce overtime but for this purpose the way the program was used to date should change:

*'I know that when we'll start using it properly, overtime will be reduced because we'll be able to organize our work better. Now we're still in the implementation phase though.'*

Perceptions concerning overtime outlined the discrepancies among those that had access to more information on the Surgical Patient Path because of their role in the operating room or to their participation in its development and those that did not. The latter consistently reported constant overtime both in the pre and post implementation periods, while the former outlined potential beneficial effects.

The Surgical Patient Path represented a stressor in the initial phase of its implementation as it was regarded as an element of novelty in the operating room's culture. The introduction of new tasks led to confusion in the daily routine and efforts had to be put in place in order to help clinicians get a full understanding of the new patient safety measure and reduce related stress:

*'...the level of stress of the operators is lower because before when we implemented the project everybody was concerned about what they had to do. Now everything is standardized, it's all in the computer. We have had a lot of courses and workshops on the project for everybody in the team and now the difficulties are not the same as in the past. The level of stress was reduced from this point of view.*

Another anesthetist deemed the reduction of the level of stress in the post implementation period to several progresses that had been achieved: (1) patient safety was improved, (2) patient flow in the operating room was improved as well, (3) surgeons were given more information on the healthcare process of their patients, and finally (4) the problem-solving process of patient issues became more systematic. It became clearer for operating room personnel whose responsibility it was to address the issues raised during the patient's path from the ward to the operating room, and this facilitated the healthcare process and the patient safety efforts. In the pre implementation period problems detected by the operator in charge of the patient's transport to the operating room were addressed individually as there was no systematic approach in place for this type of problems:

*'Stress was reduced because the Surgical Patient Path is a safety guarantee and it also improves patient flow. Even for surgeons, they need to have clear information on their patients' path and the Operating Room Management System offers them that. If a patient does not follow the predefined path that's an issue. [...]The program was built in such a manner that there is one person [physician] who is in charge of solving problems when they are detected. Patient problems are not any more solved individually by the operator [who brings the patient to the operating room].'*

The other two anesthetists did not perceive any impact on their stress level that could be attributed to the Surgical Patient Path. One anesthetist stressed that his risk awareness was raised after the implementation as he had been unaware of the risks they were taking in the previous period.

Overall job stress increased throughout the years mainly due to pressure from the management to increase efficiency in light of the financial challenges the Morgagni-Pierantoni Hospital and more generally the Italian healthcare system has been facing in recent years:

*'I think the level of stress is maybe higher than in the past [...]it has to do with the pressure from the*



*management to do more cases in the same time. We also have economic problems in this moment and I believe these factors contribute to the higher level of stress.'*

Results above are in line with the literatures who showed that as a consequence of the increasing healthcare costs, managerial attempts of tackling this problem have often focused on increasing time and efficiency pressure on physicians. This has generated negative effects on job related stress as well as on physicians' level of job satisfaction (Bovier and Perneger 2003).

Anesthetists reported a sense of responsibility for the quality of healthcare services provided. One participant claimed that the understanding of the concept of quality has changed in the operating room since the introduction of the Surgical Patient Path. Quality was internalized in the daily routine and it was no longer perceived as a requirement imposed by the management. Clinicians felt more intrinsically responsible for delivering healthcare services of the best quality possible:

*'I think for a lot of my colleagues now the quality is intrinsic, it is in our spirit. So, quality for us now is not a bad word. Before quality was just a word on paper, just some kind of bureaucratic duty for the accreditation of the hospital. Now we live the quality every day. Maybe you don't call it quality, but it is quality...'*

## **7.4. Overall results**

The findings from this study showed that the Surgical Patient Path has generally had a positive impact on the level of job satisfaction of clinicians. Surgeons have all perceived positive effects, while anesthetists and anesthetist nurses both reported to have perceived improvements although this was not stressed by the majority.

Overall, surgeons stressed the highest satisfaction levels, whereas anesthetist nurses the lowest. Similar findings concerning the impact on clinicians' levels of job satisfaction resulting from the introduction of new technologies in the operating room have been revealed by Stahl et al (2005). Anesthetist nurses reported as the key element impeding increases in their job satisfaction levels the lack of sufficient feedback. This made it impossible for them to have a clear understanding of the usefulness of their

work. Padovani et al (2013) reported that several managerial attempts were made in order to provide operating room staff with information on the aims that were sought after and the results that were achieved. More specifically, the channels used were team meetings and dashboards attached on the operating rooms' walls. Despite these measures, data indicated that nurses' understanding of the results that were achieved throughout the years was not clear enough to allow them to maintain their level of motivation.

The Surgical Patient Path has been implemented so as to increase patient safety and efficiency. The first goal was reached according to clinicians that unanimously reported that the risks of patient care decreased. This critical aspect of healthcare, was consistently identified by clinicians as responsible for increasing the quality of care. Appreciation of these achievements was to be expected as all participants stressed they felt a deep sense of responsibility for the healthcare services they delivered individually and as a group.

Participants outlined that the Surgical Patient Path impacted various dimensions of their professional lives. Unlike anesthetist nurses, the other professional profiles reported modest positive effects, while anesthetist nurses consistently mentioned relations with patients improved because their interactions have been intensified. Reversed effects on interprofessional interactions were reported. These opposite trends were intrinsically related to the fact the data collection process was done together with the patient and by doing so communication events were more frequent. On the other hand, socializing occasions among coworkers have been reduced and hindered by the fact technical issues considerably increased the amount of time nurses have to dedicate to collecting data, which appeared to be difficult to understand for those who were not involved.

Data suggested that the introduction of the Surgical Patient Path represented a stressor for all nurses. On the other side, for surgeons and anesthetists the opposite effect was outlined as stress was reduced. The variation in perceptions could objectively be linked to the fact anesthetist nurses represented the subgroup whose daily routine has been varied the most in terms of workload and complexity. Changes on work routine have been reported to be considered as stressors by anesthetist nurses. This was shown by data suggesting that participants who have experienced the expansion of the operating room in 2004 considered it to be responsible for additional job related stress. Furthermore, nurses reported that workload increased throughout the years regardless of these events. The various changes

that have been made in the operating room have forced nurses to face profound shifts in their volume and type of responsibilities. Results showing that nurses' stress and changes in the operating room routine are negatively correlated were also reported by Stahl et al 2005 and Lambrou et al (2010).

Although clinicians pointed out their workload is now higher none reported that his/her overtime has been decreased due to the effects induced by the Surgical Patient Path. This finding is in contrast with several results suggested by Agnoletti et al (2013) that argued that '*overtime events decreased in 2010 (23%) and in 2011 (21%) compared to 2009 (28%)*'<sup>7</sup>, and also by Padovani et al (2013) that showed overtime working hours expenditure was reduced by 21% between 2009 and 2010. Additionally, the anesthetist nurse coordinator in charge of planning stated that data he had access to in virtue of the fact he was in charge planning shifts showed overtime has considerably decreased. The reason why these variations have not been perceived might be due to the fact that they are not significant enough at individual levels to be perceived.

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<sup>7</sup> Agnoletti et al (2013) p. 1

## **8. CONCLUSIONS AND LIMITATIONS**

### **8.1. Conclusions**

The role played by job satisfaction in determining the quality of healthcare is a well known concept in the literature. Hence, excellence in the delivery of patient care cannot be reached by maladapted and dissatisfied clinicians (Al Juhani and Kishk 2006, Aiken et al 2002, Bhatnager and Srivastava 2012). The current study highlights the effects of a patient safety measure on the level of job satisfaction among clinicians working in the operating room - surgeons, anesthetist nurses, and anesthetists.

The Surgical Patient Path was consistently described as an effective patient safety measure by clinicians from all three professional profiles. In point of fact, they all stressed the fact that the risks of committing medical errors were reduced. The extent of the reduction was, however, unclear showing that more data disclosure on results is necessary.

Data showed that the measure's positive impacts have generally induced a higher level of job satisfaction although notable distinctions between professional profiles were identified. Positive effects were emphasized at the highest degree by surgeons who greatly appreciated the fact that the operating room became a safer environment both for clinicians and patients.

Anesthetist nurses' increase in job satisfaction was hindered mainly by two factors. They were insufficient feedback concerning results gathered during the Surgical Patient Path and technical issues of the device used for collecting the data. Despite managerial efforts to provide feedback on results achieved due to the Surgical Patient Path nurses repeatedly reported they did not suffice, thereby motivation decreased and started to be substituted by frustration and confusion concerning the purpose of the extra workload they were asked to put in practice.

Lack of sufficient knowledge on the Surgical Patient Path was also indicated by the fact that anesthetists perceptions and level of job satisfaction appeared to be greatly determined by the level of information they had access to. Clear discrepancies among anesthetists with more information and the rest were observed in the sense that more information was linked with better perceptions.

Considering that insufficient data disclosure led to date to considerable variations in terms of perceptions, to ambiguity concerning the real impact that the Surgical Patient Path has had on risks of patient care, and to a decrease in interest showed by anesthetist nurses, communication ought to be addressed and clinicians must be presented the progresses that have been achieved in virtue of the implementation of this patient safety measure. In other words, the necessary support must be put in place if clinicians are to be expected to maximize patient safety and efficiency without perceiving the Surgical Patient Path as a stressor leading to burnout situations. For this purpose, future developments of the program must be designed by bearing in mind clinicians' need to understand its importance. This is vital for the purpose of ensuring high levels of motivation to perform their tasks diligently, harmonize perceptions and increase job satisfaction of anesthetist nurses.

## **8.2. Limitations**

The current study faced some important limitations. To begin, participants were interviewed in single occasions about their perceptions of changes due to the Surgical Patient Path. Longitudinal assessments could have given a more comprehensive picture of the peculiarities that the operating room staff experienced throughout the post implementation period. Such longitudinal assessment, despite being necessary to have a more accurate understanding of the evolution of perceptions were beyond the scope of the study.

These accounts cannot be extrapolated from the circumstances that surrounded the participants. The convenience sampling method used led to findings that are inherently not generalizable and repeatable. I believe that the interviewees were representative not in a statistical sense, but in the colloquial sense of the word, of other surgeons, anesthetists, and anesthetist nurses working in the same operating room. A sample size of 12 subjects cannot be considered large enough to make generalizations that go beyond the research site.

## References

- Ministero della Sanità. 1975. 'La Distribuzione Regionale della Spesa Sanitaria (The Regional Distribution of Health Expenditure)'. Rome: Ministero della Sanità-Centro Studi.
- George F., Taroni F. 2005. 'The Evolution of Health-Policy Making in Italy'. *Journal of Health Politics, Policy and Law*, vol. 30, no. 1-2, pp. 169-188.
- Donatini A., Rico A., D'Ambrosio MG., Lo Scalzo A., Orzella L., Cicchetti A., Profili S. 2001. 'Health Care Systems in Transition. Italy'. European Observatory on Health Care Systems. Italy. Available from: [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0009/85455/E73096.pdf](http://www.euro.who.int/__data/assets/pdf_file/0009/85455/E73096.pdf) [11.02.2014].
- Hall A. 2012. 'Italy's Health Care System: Reducing Regional Disparities for At-Risk Populations'. *Annals of Health Law*, vol. 21, pp. 126-138. Available from: <http://www.luc.edu/media/lucedu/law/centers/healthlaw/pdfs/advancedirective/pdfs/8/hall.pdf> [12.02.2014].
- Paterlini M. 2013. 'Italy's Health System Reforms on Hold'. *The Lancet*, vol. 381, no. 9872, pp. 1085-1086. Available from: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(13\)60745-X/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(13)60745-X/fulltext) [14.02.2014].
- Thomson S., Osborn R., Squires D., Jun M. 2013. 'International Profiles of Health Care Systems, 2013'. The Commonwealth Fund. Available from: <http://www.commonwealthfund.org/Publications/Fund-Reports/2013/Nov/International-Profiles-of-Health-Care-Systems.aspx> [13.02.2014].
- Lozzi M. 2008. 'L'assistenza Ospedaliera in Italia' *Questioni di Economia e Finanza* (Occasional papers), no. 28. Available from: [http://www.bancaditalia.it/pubblicazioni/econo/quest\\_ecofin\\_2/qef\\_28](http://www.bancaditalia.it/pubblicazioni/econo/quest_ecofin_2/qef_28) [14.02.2014].
- European Hospital and Healthcare Federation. 2011. 'Hospitals in Europe. Healthcare data'. Available from: [http://www.hope.be/03activities/quality\\_eu-hospitals/eu\\_country\\_profiles/00-hospitals\\_in\\_europe-synthesis\\_vs2011-06.pdf](http://www.hope.be/03activities/quality_eu-hospitals/eu_country_profiles/00-hospitals_in_europe-synthesis_vs2011-06.pdf) [14.02.2014].
- Reginato, E, Grosso, R. 2011. 'European Hospital Doctors' Salaries'. European Federation of Salaried Doctors. Available from: <http://www.aemh.org/pdf/F12-002ENREV1EuropeanHospitalDoctorsSalaries.pdf> [15.02.2014].
- International Labour Organization Statistics Database. 'Wages and Hours of work in 159 countries'. Available from: <http://laborsta.ilo.org/STP/guest> [16.02.2014].
- World Salaries. 'Professional Nurses Salaries – International Comparison'. Available from: <http://www.worldsalaries.org/professionalnurse.shtml> [16.02.2014].
- OECD. 2013. 'Remuneration of Nurses'. *Health at a Glance 2013: OECD Indicators*. OECD Publishing.
- Robinson S., Griffiths P. 2007. 'Nursing Education and Regulation: International Profiles and Perspective'. King's College London. Available from: <http://eprints.soton.ac.uk/348772/1/NurseEduProfiles.pdf> [16.02.2014].
- The Emilia-Romagna Regional Health Service. 2013. 'Facilities, Expenditure, Activities as of 31.12.2011 Programs, Agreements and Organizational Models'. Available from:

[http://www.saluter.it/documentazione/rapporti/ssr/Pubblicazione\\_SSR\\_ingl2012.pdf](http://www.saluter.it/documentazione/rapporti/ssr/Pubblicazione_SSR_ingl2012.pdf) [18.02.2014].

Gallelli T., Darchini A. 2013. 'SOLE (Healthcare online) and EHR (Electronic health Record-FSE Emilia-Romagna)'. Emilia-Romagna Regional Health Service. Available from: [http://assr.regione.emilia-romagna.it/it/aree\\_attivita/governance-della-ricerca/progetti\\_internazionali/eip-aha/materiali-e-documentazione/workshop-eip-aha/scheda\\_sole.pdf/at\\_download/file/scheda\\_sole.pdf](http://assr.regione.emilia-romagna.it/it/aree_attivita/governance-della-ricerca/progetti_internazionali/eip-aha/materiali-e-documentazione/workshop-eip-aha/scheda_sole.pdf/at_download/file/scheda_sole.pdf) [18.02.2014].

Maio V., Rossi G., Del Canale S., Fabi M., Brianti E., Sforza S., Robeson M., Keith S., Gonnella J., Louis D. 2013. 'Models for Identifying Patients at Risk of Hospitalization. Use in Medical Homes in Emilia-Romagna Region, Italy'. Population Health Matters (formerly Health Policy Newsletter), vol. 26, no. 4, art. 7. Available from: <http://jdc.jefferson.edu/hpn/vol26/iss4/7/> [18.02.2014].

Greco J. 2013. '2013 Italy Study Tour. The Global Health Perspective '. Available from: <http://www.closingthegap.ca/wp-content/uploads/2013/05/Italy-Study-Tour-Final-Report-J.-Greco-Nov.-2013.pdf> [18.02.2014].

Agnoletti V., Buccioli M., Padovani E., Ruggero M., Perger P., Piraccini E., Orelli L. R., Maitan S., Dell'Amore D., Garcea D., Vicini C., Montella T., Gambale G. 2013. 'Operating Room Data Management: Improving Efficiency and Safety in a Surgical Block'. BMC Surgery, vol. 13, no. 7, pp. 1-11. Available from: <http://www.biomedcentral.com/1471-2482/13/7> [25.02.2014].

Padovani E., Orelli L. R., Young W. D. 2013. 'Implementing Change in a Hospital Management Accounting System'. Public Management Review, vol. 00, no. 00, pp. 1-21. Available from: <http://www.tandfonline.com/doi/abs/10.1080/14719037.2013.792383#.Uwy2tnm1nwI> [25.02.2014].

Buccioli M., Grementieri P., Signani R., Agnoletti V., Vetri E., Dal Monte D., Gambale G. 2012. 'Qualita' e Sicurezza del Paziente Chirurgico: Information Technology per la Governance di un Percorso Integrato'. Evidence vol. 4, no. 1. Available from: <http://www.evidence.it/articolodettaglio/209/it/355/qualita-e-sicurezza-del-paziente-chirurgico-information-techno/articolo> [25.02.2014].

Hofmarcher M M., Rack H-M. 2006. 'Austria: Health System Review. Health Systems in Transition'. The European Observatory on Health Systems and Policies, vol. 8, no. 3. Available from: [http://www.euro.who.int/\\_data/assets/pdf\\_file/0009/96435/E89021.pdf](http://www.euro.who.int/_data/assets/pdf_file/0009/96435/E89021.pdf) [18.03.2014].

OECD. 2009. 'Practising nurses'. Health at a Glance 2009: OECD Indicators, OECD Publishing. Available from: [http://dx.doi.org/10.1787/health\\_glance-2009-31-en](http://dx.doi.org/10.1787/health_glance-2009-31-en) [18.03.2014].

The World Bank. 2014. 'Physicians (per 1,000 people)'. Available from: <http://data.worldbank.org/indicator/SH.MED.PHYS.ZS?page=1> [18.03.2014].

Bhatnager K., Srivastava K. 2012. 'Job Satisfaction in Health-Care Organizations'. Industrial Psychiatry Journal, vol. 21, no. 1, pp. 75. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3678186/> [09.03.2014].

Saifuddin KS., Nawaz A., Farzand AJ., Muhammad IK. 2012. 'Synthesizing the Theories of Job-Satisfaction Across the Cultural/Attitudinal Dementions'. IJCRB, vol. 2, no. 9, pp. 1382-1396. Available from: <http://www.journal-archieves14.webs.com/1382-1396.pdf> [27.02.2014].

Value Based Management. 2014. 'Existence, Relatedness, Growth Theory '. Available from [http://www.valuebasedmanagement.net/methods\\_alderfer\\_erg\\_theory.html](http://www.valuebasedmanagement.net/methods_alderfer_erg_theory.html) [10.03.2014].

- Management Study Guide. 2014. 'Reinforcement Theory of Motivation'. Available from <http://managementstudyguide.com/reinforcement-theory-motivation.htm> [10.03.2014].
- Bovier PA., Perneger TV. 2003. 'Predictors of Work Satisfaction Among Physicians'. *European Journal of Public Health*, vol. 13, no. 4, pp. 299-305. Available from: <http://eurpub.oxfordjournals.org/content/13/4/299.full.pdf> [05.03.2014].
- Pislarj T., Van der Lippe T., Den Dulk L. 2011. 'Health among hospital employees in Europe: A Cross-National Study of the Impact of Work Stress and Work Control'. *Social Science & Medicine* vol. 72, no. 6, p. 899-906. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21330025> [28.02.2014].
- Ramirez AJ., Graham J., Richards MA., Cull A., Gregory WM. 1996. 'Mental Health of Hospital Consultants: The effects of Stress and Satisfaction at Work'. *Lancet*, vol. 347, no. 9003, pp. 724-728. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/8602002> [06.03.2014].
- Lambrou P., Kontodimopoulos N., Niakas D. 2010. 'Motivation and Job Satisfaction Among Medical and Nursing Staff in a Cyprus Public General Hospital'. *Human resources for health*, vol.8, no. 1, pp. 26. Available from: <http://www.human-resources-health.com/content/8/1/26> [05.03.2014].
- Helmreich R., Davies JM. 1996. 'Human Factors in the Operating Room: Interpersonal Determinants of Safety, Efficiency and Morale'. *Baillière's Clinical Anaesthesiology*, vol. 10, no. 2, pp. 277-295. Available from: <http://www.sciencedirect.com/science/article/pii/S0950350196800171> [01.03.2014].
- Krogstad U., Hofoss D., Veenstra M., Hjortdahl P. 2006. 'Predictors of Job Satisfaction Among Doctors, Nurses and Auxiliaries in Norwegian Hospitals: Relevance for Micro Unit Culture'. *Human Resources for Health*, vol. 4, no. 1, pp. 3. Available from: <http://www.human-resources-health.com/content/pdf/1478-4491-4-3.pdf> [05.03.2014].
- Waterman AD., Garbutt J., Hazel E., Dunagan WC., Levinson W., Fraser VJ., Gallagher TH. 2007. 'The Emotional Impact of Medical Errors on Practicing Physicians in the United States and Canada'. *Joint Commission Journal on Quality and Patient Safety* vol. 33, no. 8, pp. 467-476. Available from: <http://bolognaita.library.ingentaconnect.com/content/jcaho/jcjq/2007/00000033/00000008/art00001> [07.03.2014].
- Shanafelt TD., Balch CM., Bechamps G., Russell T., Dyrbye L., Satele D., Collicott P., Novotny P., Sloan J., Freischlag J. 2009. 'Burnout and Medical Errors Among American Surgeons'. *Annals of Surgery*, vol. 251, no. 6, pp. 995-1000. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/19934755> [28.02.2014].
- Carney BT., West P., Neily J., Mills P., Bagian JP. 2010. 'Difference in Nurse and Surgeons Perceptions of Teamwork: Implications for Use of a Briefing Checklist in the OR'. *AORN Journal*, vol. 91, no. 6, pp.722-729. Available from: <http://www.sciencedirect.com/science/article/pii/S0001209210003273> [28.02.2014].
- Flin R., Fletcher G., McGeorge P., Sutherland A., Patey R. 2003. 'Anesthetists' Attitudes to Teamwork and Safety' *Anesthesia*, vol. 58, no. 3, pp. 233-242. Available from: <http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2044.2003.03039.x/full> [07.03.2014].
- Gaba D. M., Howard S. K., Jump B. 1994. 'Production pressure in the work environment: California anesthesiologists' attitudes and experiences'. *Anesthesiology*, vol. 81, no. 2, pp. 488-500. Available from: [http://journals.lww.com/anesthesiology/Abstract/1994/08000/Production\\_Pressure\\_in\\_the\\_Work\\_Envir](http://journals.lww.com/anesthesiology/Abstract/1994/08000/Production_Pressure_in_the_Work_Envir)



[onment\\_28.aspx](#) [07.03.2014].

Lindfors PM., Meretoja OA., Luukkonen RA., Elovainio MJ., Leino TJ. 2009. 'Attitudes to Job Turnover Among Finnish Anaesthetists'. *Occupational Medicine*, vol. 59, no. 2, pp. 126-129. Available from: <http://occmed.oxfordjournals.org/content/59/2/126.full> [08.03.2014].

Lu H., Barriball KL., Zhang X., While AE. 2012. 'Job Satisfaction Among Hospital Nurses Revisited: A Systematic Review'. *International Journal of Nursing Studies*, vol. 49, no. 8, pp. 1017-1038. Available from: <http://www.sciencedirect.com/science/article/pii/S0020748911004536> [07.03.2014].

Glazer S., Gyurak A. 2008. 'Sources of Occupational Stress Among Nurses in Five Countries'. *International Journal of Intercultural Relations*, vol. 32, no. 1, pp. 49-66. Available from: <http://www.sciencedirect.com/science/article/pii/S014717670700079X> [07.03.2014].

Chen CK., Lin C., Wang SH., Hou TH. 2009. 'A Study of Job Stress, Stress Coping Strategies, and Job Satisfaction for Nurses Working in Middle-Level Hospital Operating Rooms'. *Journal of Nursing Research*, vol. 17, no. 3, pp. 199-211. Available from: [http://journals.lww.com/jnr-twna/Abstract/2009/09000/A\\_Study\\_of\\_Job\\_Stress,\\_Stress\\_Coping\\_Strategies..8.aspx](http://journals.lww.com/jnr-twna/Abstract/2009/09000/A_Study_of_Job_Stress,_Stress_Coping_Strategies..8.aspx) [07.03.2014].

Stahl JS., Egan MT., Goldman JM., Tenney D., Wiklund RA., Sandberg WS., Gazelle S., Rattner D. 2005. 'Introducing New Technology Into the Operating Room: Measuring the Impact on Job Performance and Satisfaction'. *Surgery*, vol. 137, issue 5, pp. 518-526. Available from: [http://www.surgjournal.com/article/S0039-6060\(05\)00004-8/abstract](http://www.surgjournal.com/article/S0039-6060(05)00004-8/abstract) [28.02.2014].

Heslin MJ., Doster BE., Daily SL., Waldrum MR., Boudreaux AM., Smith AB., Peters G., Ragan DB., Buchalter S., Bland K., Rue LW. 2008. 'Durable Improvements in Efficiency, Safety, and Satisfaction in the Operating Room'. *Journal of the American College of Surgeons*, vol. 206, no. 5, pp. 1083-1089. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18471761> [06.03.2014].

Seiden S. C., Barach, P. 2006. 'Wrong-Side/Wrong-Site, Wrong-Procedure, and Wrong-Patient Adverse Events: Are They Preventable?'. *Archives of surgery*, vol. 141, no. 9, pp. 931-939. Available from: <http://archsurg.jamanetwork.com/article.aspx?articleid=398954> [04.04.2014].

Leape L. L., Woods D. D., Hatlie M. J., Kizer K. W., Schroeder S. A., Lundberg G. D. 1998. 'Promoting Patient Safety by Preventing Medical Error'. *JAMA*, vol. 280, no. 16, pp 1444-1447. Available from: <http://jama.jamanetwork.com/article.aspx?articleid=188093> [04.04.2014].

Pani J. R., Chariker J. H. 2004. 'The psychology of error in relation to medical practice'. *Journal of surgical oncology*, vol. 88, no.3, pp. 130-142. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/jso.20123/abstract> [03.04.2013].

Awad S. S., Fagan S. P., Bellows C., Albo D., Green-Rashad B., De La Garza M., Berger D. H. 2005. 'Bridging the communication gap in the operating room with medical team training'. *The American Journal of Surgery*, vol.190, no. 5, pp. 770-774. Available from: <http://www.sciencedirect.com/science/article/pii/S000296100500646X> [28.03.2014].

Lingard L., Espin S., Whyte S., Regehr G., Baker G. R., Reznick R., Bohnen J., Orser B., Doran D., Grober E. 2004. 'Communication failures in the operating room: an observational classification of recurrent types and effects'. *Quality and Safety in Health Care* vol. 13, no. 5 pp. 330-334. Available from:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1743897/pdf/v013p00330.pdf> [28.03.2014].

Sexton J. B., Thomas E. J., Helmreich R. L. 2000. 'Error, stress, and teamwork in medicine and aviation: cross sectional surveys'. *Bmj*, vol. 320, no. 7237, pp. 745-749. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC27316/> [28.03.2014].

SPOT Database, VA National Center for Patient Safety. 2004. Available at [www.patientsafety.gov/resources](http://www.patientsafety.gov/resources) [30.09.2014] cited in Awad et al 2005.

Makary M. A., Sexton J. B., Freischlag J. A., Holzmueller C. G., Millman E. A., Rowen L., & Pronovost P. J. 2006. 'Operating room teamwork among physicians and nurses: teamwork in the eye of the beholder'. *Journal of the American College of Surgeons*, 202(5), 746-752. Available from: <http://www.sciencedirect.com/science/article/pii/S1072751506001177> [31.03.2014].

Christian C. K., Gustafson M. L., Roth E. M., Sheridan T. B., Gandhi T. K., Dwyer K., Zinner M. J., Dierks M. M. 2006. 'A prospective study of patient safety in the operating room'. *Surgery*, vol. 139, no. 2, pp. 159-173. Available from: <http://www.ezsurgical.com/ClinicalArticlesFiles/A%20prospective%20study%20of%20patient%20safety%20in%20the%20operating%20room.pdf> [01.04.2014].

Gawande A. A., Studdert D. M., Orav E. J., Brennan T. A., Zinner M. J. 2003. 'Risk factors for retained instruments and sponges after surgery'. *New England Journal of Medicine*, vol. 348, no. 3, pp. 229-235. Available from: <http://www.nejm.org/doi/pdf/10.1056/NEJMsa021721> [01.04.2014].

Kable A. K., Gibberd R. W., Spiegelman R. W. 2002. 'Adverse events in surgical patients in Australia'. *International Journal for Quality in Health Care*, vol. 14, no. 4, pp. 269-276. Available from: <http://intqhc.oxfordjournals.org/content/14/4/269.full.pdf> [01.04.2014].

Leape L. L., Brennan T. A., Laird N., Lawthers A. G., Localio A. R., Barnes Benjamin A., Hebert L., Newhouse J. P., Weiler P. C., Hiatt H. 1991. 'The nature of adverse events in hospitalized patients: results of the Harvard Medical Practice Study II'. *New England journal of medicine*, vol. 324, no. 6, pp 377-384. Available from: [http://www.aegris.org/blog/Harvard\\_II.pdf](http://www.aegris.org/blog/Harvard_II.pdf) [01.04.2014].

Kohn L., Corrigan J. M., Donaldson J. M. 2001. 'To err is human: building a safer health system. 1999'. Institute of Medicine-Committee on Quality of Health Care in America. Available from: <http://www.iom.edu/~media/Files/Report%20Files/1999/To-Err-is-Human/To%20Err%20is%20Human%201999%20%20report%20brief.pdf> [01.04.2014].

Kwaan M. R., Studdert D. M., Zinner M. J., Gawande A. A. 2006. 'Incidence, patterns, and prevention of wrong-site surgery'. *Archives of Surgery*, vol. 141, no. 4, pp. 353-358. Available from: <http://www.atulgawande.com/documents/IncidentsPatternsandPrevalenceofWrong-SiteSurgery.pdf> [03.04.2014].

Meinberg E.G., Stern P. J. 2003. 'Incidence of wrong-site surgery among hand surgeons'. *The Journal of Bone & Joint Surgery*, vol. 85, no. 2, pp. 193-197. Available from: <http://www.jbjs.org/content/85/2/193.long> [03.04.2014].

Makary M. A., Mukherjee A., Sexton B., Syin D., Goodrich E., Hartmann E., Rowen L., Behrens D. C., Marohn M., Pronovost P. J. 2007. 'Operating Room briefings and Wrong-Site Surgery'. *American College of Surgeons*, vol. 204, no. 2, pp. 236-243. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17254927> [24.03.2014].

- Halverson A. L., Casey J. T., Andersson J., Anderson K., Park C., Rademaker A. W., Moorman D. 2011. 'Communication failure in the operating room'. *Surgery*, vol. 149, no. 3, pp. 305-310. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20951399> [30.03.2014].
- Parush A., Kramer C., Foster-Hunt T., Momtahan K., Hunter A., Sohmer, B. 2011. 'Communication and team situation awareness in the OR: Implications for augmentative information display'. *Journal of Biomedical Informatics*, vol. 44, no. 3, pp. 477-485. Available from: <http://www.sciencedirect.com/science/article/pii/S1532046410000493> [30.03.2014].
- Flin R., Yule S., McKenzie L., Paterson-Brown S., Maran, N. 2006. 'Attitudes to teamwork and safety in the operating theatre'. *The Surgeon*, vol. 4, no. 3, pp. 145-151. Available from: <http://www.sciencedirect.com/science/article/pii/S1479666X06800843> [02.04.2014].
- Pani J. R., Chariker J. H. 2004. 'The psychology of error in relation to medical practice.' *Journal of surgical oncology*, vol. 88, no.3, pp. 130-142. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/jso.20123/abstract> [03.04.2013].
- Edmondson A. C. 1996. 'Learning From Mistakes Is Easier Said Than Done: Group and Organizational Influences on the Detection and Correction of Human Error'. *Journal of Applied Behavioral Sciences*, vol. 32, no. 1, pp. 5-28. Available from: <http://jab.sagepub.com/content/32/1/5.abstract> [04.04.2014]
- Greenberg C. C., Regenbogen S. E., Studdert D. M., Lipsitz S. R., Rogers S. O., Zinner M. J., Gawande A. A. 2007. 'Patterns of Communication Breakdowns Resulting in Injury to Surgical Patients'. *American College of Surgeons*, vol. 204, no. 4, pp. 533-540. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17382211> [24.03.2014].
- Moss J., Xiao Y. 2004. 'Improving Operating Room Coordination: Communication Pattern Assessment'. *Journal of Nursing Administration*, vol. 34, no. 2, pp. 93-100. Available from: <http://interruptions.net/literature/Moss-JONA04.pdf> [04.04.2014].
- Gillespie B. M., Chaboyer W., Murray P. 2010. 'Enhancing communication in surgery through team training interventions: a systematic literature review'. *AORN Journal*, vol. 92, no. 6, pp. 642-657. Available from: <http://www.sciencedirect.com/science/article/pii/S0001209210008781> [02.04.2014].
- Salas E., Diaz-Granados D, Weaver S. J., King H. 2008. 'Does team training work? Principles for health care'. *Acad Emerg Med.*, vol. 15, no. 11, pp. 1002-1009. Available from: <http://onlinelibrary.wiley.com/store/10.1111/j.1553-2712.2008.00254.x/asset/j.1553-2712.2008.00254.x.pdf?v=1&t=hw25p0uq&s=e0dab5852dbc344e09582ddf301d926a0e222d13> [02.04.2014].
- Mills P., Neily J., Dunn E. 2008. 'Teamwork and communication in surgical teams: implications for patient safety'. *Journal of the American College of Surgeons*, vol. 206, no. 1, pp. 107-112. Available from: <http://www.sciencedirect.com/science/article/pii/S1072751507007739> [02.04.2014].
- Firth-Cozens J. 1995. 'Tackling risk by changing behaviour'. *Quality in Health Care*, vol. 4, no. 2, pp. 97-101. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1055296/> [04.04.2014].
- Lingard L., Regehr G., Orser B., Reznick R., Baker G. R., Doran D., Espin S., Bohnen J., Whyte, S. 2008. 'Evaluation of a preoperative checklist and team briefing among surgeons, nurses, and anesthesiologists to reduce failures in communication'. *Archives of Surgery*, vol. 143, no. 1, pp. 12-17. Available from:

[http://clinicalhumanfactorsgroup.org/resources/08\\_qrt04/Lingard\\_et\\_al\\_Evaluation\\_of\\_a\\_checklist\\_briefing\\_ArchSurg2008.pdf](http://clinicalhumanfactorsgroup.org/resources/08_qrt04/Lingard_et_al_Evaluation_of_a_checklist_briefing_ArchSurg2008.pdf) [04.04.2014].

Altpeter T., Luckhardt K., Lewis J. N., Harken A. H., Polk H. C. 2007. 'Expanded surgical time out: a key to real-time data collection and quality improvement'. Journal of the American College of Surgeons, vol. 204, no. 4, pp. 527-532. Available from: <http://www.sciencedirect.com/science/article/pii/S1072751507000609> [02.04.2014].

World Health Organization. 2014. '10 facts on patient safety'. Available from: [http://www.who.int/features/factfiles/patient\\_safety/patient\\_safety\\_facts/en/](http://www.who.int/features/factfiles/patient_safety/patient_safety_facts/en/) [23.04.2014].

Ministero del Lavoro, della Salute e delle Politiche Sociali. 2009. 'Manuale per la Sicurezza in Sala Operatoria: Raccomandazioni e Checklist'. Available from: [http://www.salute.gov.it/imgs/C\\_17\\_pubblicazioni\\_1119\\_allegato.pdf](http://www.salute.gov.it/imgs/C_17_pubblicazioni_1119_allegato.pdf) [23.04.2014].

Ravizza S. 2007. 'Errori medicali, uno su tre in sala operatoria'. Corriere della Sera, April 22<sup>nd</sup> 2007. Available from: [http://archiviostorico.corriere.it/2007/aprile/22/Errori\\_medici\\_uno\\_tre\\_sala\\_co\\_7\\_070422012.shtml](http://archiviostorico.corriere.it/2007/aprile/22/Errori_medici_uno_tre_sala_co_7_070422012.shtml) [23.04.2014].

World Health Organization. 2014. 'Patient Safety. Data and Statistics'. Available from: <http://www.euro.who.int/en/health-topics/Health-systems/patient-safety/data-and-statistics> [23.04.2014].

Bazeley P. 2013. 'Qualitative data analysis: Practical strategies'. Sage.

Reeves S., Simon L. 2004. 'Interprofessional collaboration in the hospital: strategies and meanings'. Journal of Health Services Research & Policy, vol. 9, no. 4, pp. 218-225. Available from: <http://hsr.sagepub.com/content/9/4/218.full.pdf+html> [29.05.2014].

Al Juhani A. M., Kishk N. A. 2006. "Job satisfaction among primary health care physicians and nurses in Al-Madinah Al-Munawwarah". J Egypt Public Health Assoc, vol. 81, no. 3-4, pp. 165-180. Available from: <http://www.epha.eg.net/pdf/n3-4-2006/2-Nahla%20keshk-Job%20Satisfaction.pdf> [03.06.2014].

Aiken L. H., Sean P. C., Douglas M. S. 2002. 'Hospital staffing, organization, and quality of care: cross-national findings'. International Journal for quality in Health care vol. 14, no. 1, pp. 5-14. Available from: <http://intqhc.oxfordjournals.org/content/14/1/5.full.pdf+html> [03.06.2014].

# Appendix I

## Questionnaire Morgagni-Pierantoni Hospital

Age:.....  
Working experience at MPH:.....  
Sex:.....  
Ward:.....  
Profession:.....

### **Patient care**

1. Did the relation with your patients change after the introduction of the patient safety measures? In which way?
2. Is the quality of care you are providing now after the introduction of the patient safety measures is higher than before?

### **Burden**

3. Is the level of stress you experience now at work the same as before the introduction of the Operating Room Management System, e.g. 2005 compared to 2014?
4. Did overtime work decrease after the introduction of the Operating Room Management System?
5. After the introduction of the Operating Room Management System do you feel better managed and resourced?
6. Do you have a sense of responsibility for the work quality of the staff in your team?
7. How much of the variation of your stress level would you attribute to the Operating Room Management System?
8. Did the risk of future clinical errors (wrong site/patient/intervention) decrease after the introduction of the Operating Room Management System?

### **Professional relations**

9. Did your professional relation with other medical staff improve after the introduction of the

Operating Room Management System?

**General satisfaction**

10. All things considered, did your level of satisfaction increase after the introduction of the Operating Room Management System?